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The increasing industrialization of U.S. agricultural production and marketing has two aspects: the purely technical one of increased mechanization and improved control over biological production processes, and the role of institutions by which agriculture is organized into a coordinated system. The author of the first article offers suggestions on how the technical aspect might continue its contribution while maintaining the essential features of the present system of organization.

Workmen's compensation, an aspect of an industrial agriculture, is treated in the second article. The workmen's compensation act in Illinois is essentially an insurance system to compensate employees for work-connected injuries. Illinois farmers may choose to come under the act and thus gain limited liability in the event an employee is killed or injured. Since the employer pays for workmen's compensation, this cost should be compared with commercial employee's liability insurance.

Another facet of the industrialization process in agriculture is the dwindling number of opportunities for farm-reared youth to farm. Many of the young people who take non-farm jobs are handicapped by lack of education. The third article reports on a pilot study of the educational needs of rural youth in Illinois. College plans of high school students were related to personality traits and educational achievement scores. As might be expected, those planning to go to college rated higher on educational achievement. Occupational aspirations held by students are also reported.

A number of studies have been made of how soil conservation practices affect farm income. When actual farms are studied it is difficult for the research worker to isolate the effect of soil conservation on income. Even if size of farm and soil type are held constant many other factors influence farm-to-farm variation in income — management ability, use of fertilizers, amounts of livestock, etc. An alternative method of analysis is to use soil-loss data as a basis for calculating yield losses. This method was used in the study reported in the fourth article. The results indicate that farmers on Swygert soils sacrifice income by adopting rotations that keep soil losses within recommended tolerances.

A study of Australian agricultural price policies is presented in the final article. The classification of these policies is useful not only as a study of the Australian situation, but it gives us a basis for studying U.S. policies and making interesting comparisons. A broad classification into three groups is used — measures to control or influence supply, measures to influence demand, and measures to directly augment prices. Patterns appearing in the Australian experience include a strong tendency toward programs of supply diversion, and the use of import duties and buffer or stabilization funds.

ILLINOIS AGRICULTURAL ECONOMICS

The Emerging Structure of U.S. Agriculture: Traditional or Industrial?

HAROLD F. BREIMYER

FARMERS, and most nonfarmers, are well aware of how the profile of U. S. agriculture is being resculptured. There are dozens of trends and developments that were unknown to our forefathers. Among them are attempts to organize farmers for mass bargaining power; 30 years of government influence on use of land and on prices; producing poultry under vertical integration, which requires the farmer only to provide housing, keep feeders filled, and watch for trouble; new methods of marketing, such as food chains' direct buying in huge quantities; marketing under market-wide orders or agreements, as in fluid milk and western fruits and vegetables; consumers' insistence on quality inspection, and touchiness on cholesterol, chemical residues, etc.; strange new ways of fighting for foreign markets, marked by the first "chicken war" in history; and seemingly boundless productivity and persistent surpluses.

These and other changes are readily observed. They are less readily understood. Questions are raised as to whether they have a common origin, what their future may be, and above all whether they promise a bright new era for our traditional agriculture, or its demise.

Ironically, many of these questions are appearing just after a century of progress in U.S. agriculture was widely celebrated. Many of the research and educational services to agriculture are now a hundred years old. The Morrill (land-grant college) Act, the U.S. Department of Agriculture, a number of state universities, and the Homestead Act all recently marked their one-hundredth birthdays. Each has been dedicated to bringing productiveness and stature to U.S. farms — farms organized primarily as individual family units.

The fruitfulness of the efforts of such institutions is well known. It is one of the world's success stories. As a result, the fear of food shortages which has haunted most peoples throughout history has vanished from the American scene. U.S. consumers, increasing in numbers, eat better than ever before and, almost miraculously, fewer farmers are needed to feed them.

In addition, the competence and status of the family farmer have been lifted. From the slave, the serf, and the medieval peasant has emerged the skilled, modern, family farmer. This achievement is a great tribute to the educational and other institutions which were instrumental in bringing it about.

Although perhaps less appreciated today, farming and the rural community in the United States doubtless contributed also to the stability and sense of responsibility in citizenship that Thomas Jefferson saw as a bulwark to democracy.

If the record is so good, why is our agricultural system now challenged? In what way, if any, does it now fall short?

Agriculture in an Industrial World

Probably the common chord to all the trends named in the opening paragraph is the industrial component which is in-

creasingly entering into agriculture. Ours is ever more an urban-industrial age, and less an agrarian one. The characteristics of city life and of manufacturing and commerce are being imposed upon agriculture. The most critical decisions agriculture will make in future years will be concerned with the extent to which it will give way, versus the extent to which it will seek to retain its identity.

Urban industry affects agriculture in many ways. It makes agriculture more technically complex. The farmer who once needed rather simple knowledge plus a strong back must now know the chemistry of soil nutrients, the mechanics of operating a combine, the accounting of filing his tax forms, and the economics of choosing the time to buy and sell his cattle. One moral from this is pretty obvious: If the farmer is to remain an independent manager, an "entrepreneur," he will need even more educational help than before. He will likely move even farther toward specialization, and he will require more specialized counsel in connection with it.

But today's technology is more than know-how. It is new resources — industrially produced resources. Ancient farming consisted chiefly of man on land. The farmer of the 20th century is still a man tilling land but he is sheltered and helped by an enormous panoply of machines, fuels, chemical fertilizers, herbicides, electric power, and other resources brought from outside the farm. The USDA Economic Research Service has estimated that as recently as 1940 about 66 percent of all resources used in farming were land and farm-resident labor. The remaining 34 percent were purchased capital inputs. By 1961 the ratio was almost reversed. Land and farm labor were down to 37 percent of total resources used and purchased inputs were 63 percent. This is an amazing change for so short a time.

Often, these new resources are seen as merely making agriculture more productive. They do that. But from the standpoint of managing our agriculture, more important is the fact that they loosen many of the restraints on productivity. Formerly, at any given time the supply of land and farm labor was limited and so, therefore, was output. But industrial materials are available to agriculture in almost unlimited supply. Consequently, the use of these materials has a decided effect on the volume of farm output. And the decisions as to the quantities of industrial goods to be used become, year in and year out, decisions as to what total farm output will be.

In our system of agriculture, such decisions are made largely by individual farmers. Except for the effects of annual variation in weather, these farmers determine how much is to be produced. Even the cotton, tobacco, and similar government programs only influence the amount of acreage planted; they do not restrict other inputs. Thus, more managerial wisdom is required than ever before if production is to be geared to the market with fair accuracy. A big question in farm policy is whether the traditional institutions of agriculture are equal to the task. Can individual, independent farmers regulate the resources of agriculture so as to provide amply for consumers without running into overproduction and low prices?

Although opinions on this question differ widely, a number of measures to help farmers meet their new and larger tasks have been proposed. Several are listed at the end of this article.

Changes in Farm Markets

Less noted but not less noteworthy have been the changes taking place in farm markets. Modern transport has brought the eclipse of some central wholesale markets. Direct trading has often

replaced them. Probably of more significance is the growth in size and power of the firms that sell to agriculture and buy from it. In some trade channels a few firms dominate. The clearest example of change is in retailing, where small grocery stores have given way to supermarkets and various corporate and voluntary chains.

Large market firms offer a contrast with the smallness of individual farms. This difference introduces the spectre of such firms being able to exert unwarranted market power. An issue of this kind must be dealt with case by case, not in generalities. On the other hand, market firms are becoming more exacting in their demands upon agriculture. Those firms are providing ever more servicing to farm products, and doing so through the use of techniques of mass handling and mass processing. As a consequence they are insisting that farm products be marketed in large quantities, in more standardized qualities, and on a more regular time schedule. In other words, they are resisting the lack of order which characterizes the seasonal production of farm products of uncertain quality in unpredictable quantity on several million scattered farms.

Agriculture's Institutions of Coordination

All this is not wholly new. For two centuries a contrast, if not conflict, has been evident between the ways industry and agriculture are constituted. But the differences have become more apparent recently. And some policy issues are coming into more prominence.

Moreover, U.S. agriculture has long devised means to grapple with the pressures and precedents arising in the industrial, nonfarm world. The typical farmer likes to declare how independent he is. The claim is something of an illusion. The farmer has long joined informally with his neighbors in exchanging work at harvest season and on special occasions such as a barn raising. He has looked to government to build roads so he could reach his market. In recent years, many means have been developed (formal and informal, private and public) to bridge the gap between the independence of the individual farm and the complexities of the modern economy.

Farmers draw on research and extension services for vital knowledge. They utilize commercial farm management services. They get electric power from rural electric cooperatives, and sometimes telephone service too. They obtain help from the local soil conservation district in protecting their soil. They spend almost a billion dollars a year for custom work. They may buy and sell through farmer cooperatives, whose total business is increasing. Some farmers sell their product at prices negotiated by one of the 325 bargaining associations now in existence.[1] The list could go on and on.

Almost certainly, if U.S. agriculture is to hold to its traditional makeup of independent units it will have to utilize existing institutions to that purpose, or even form some new ones.

Or, agriculture can move down one of two other paths — horizontal combination into super farms, or vertical integration. These too can be regarded as contributions of industry to agriculture. They are industry's managerial tools, transferable to agriculture.

The combining of individual farm units into large corporation-style organizations, on an extensive scale, would convert agriculture into a few thousand big-business operations. In its financing

[1] J. Kenneth Samuels, Bargaining Activities in Other Commodities. Proceedings of Fifth National Conference on Fruit and Vegetable Bargaining Cooperatives. U.S. Dept. Agr., FCS. p. 49. Jan., 1961.

and management such an agriculture would be patterned after corporate business. Each large "farm" would have a board of directors, several layers of administrative officials, and wage-earning employees of various skill categories. There might even be a director of public relations, an advertising budget, and other trappings of modern business that have been almost absent from agriculture.

Some spokesmen for agriculture both foresee and welcome a system of this type. Their argument is that an agriculture of mammoth units would be able to manage its affairs for higher and more stable returns than are now received.

Opinions vary as to how much large-scale agriculture now exists. Some examples are quite obvious. One of the best known is the larger-sized, commercial feedlot for cattle. Several land companies have huge holdings, although they often sublease them rather than operate them directly.

The U.S. Department of Agriculture tends to minimize the extent of large-scale farming in agriculture today. The National Agricultural Advisory Commission, a presidentially appointed body that is advisory to the Secretary of Agriculture, recently issued a statement reassuring that most farming is still family farming.[2] A special census study presents a somewhat different picture. It shows the number of farms with sales of $100,000 or more in 1959. The figure is arbitrary and does not distinguish exactly between family farms and larger-than-family farms. Nevertheless the data are of interest. In 1959 almost 20,000 farms exceeded $100,000 of sales. Their total sales accounted for 16.9 percent of sales from all commercial farms. For six major products they represented a fourth or more of all commercial sales: sugarcane, 58 percent; vegetables, 47 percent; forest products and horticultural specialities, 40 percent; fruits and nuts, 32 percent; potatoes, 30 percent; and rice, 25 percent.[3]

Whatever uncertainty there may be about horizontal combination into super farms, there is none about the growth of the various contractual arrangements known as vertical integration. They have come on the farm scene by leaps and bounds. According to Prof. E. P. Roy, Louisiana State University, about 95 percent of all broilers in the United States are grown under some type of vertical integration. The production may be under contract or on company-owned farms. About 95 percent of hatching eggs, 35 percent of table eggs, 85 percent of turkeys, 10 percent of hogs, and 30 percent of fed cattle are produced under similar arrangements. Most vegetables for canning or freezing are produced under contract or on the processor's land (leased or owned). Marketing contracts with cooperatives characterize the marketing of much milk and citrus fruit.[4]

It is necessary to distinguish between mere advance selling on contract, as of feeder calves, and vertical integration of a more sweeping nature. The latter is distinguished by two features: it (a) transfers much of the managerial authority of the farmer off the farm, and (b) sets returns to farmers according to terms of the contract rather than according to market prices. In cases of outright ownership a labor contract may be used. Farmers are generally more sensitive to the change in managerial status, than to changes in marketing. Farm organiza-

[2] The Family Farm in American Agriculture, A Report of the National Agricultural Advisory Commission. USDA mimeo. Nov., 1963.

[3] Large Scale Farming in the United States, Census of Agr., 1959. U.S. Bur. of Census, Special Rpts., Vol. 5, Part 7. May, 1963.

[4] Ewell Paul Roy, Contract Farming U.S.A. Interstate Press, Danville, Ill. pp. 11-12. 1963.

tions, for example, have deplored reducing the farmer's managerial role. It is possible that the loss of a market system for determining prices of products, and thereby the rewards to farmers for their productive effort, is the more significant aspect. A market exchange system, built up over centuries, has pronounced merits.

Unlike negotiation of the terms of a contract, market pricing is aided by a number of measures to bring buyers and sellers together, to provide information by means of market news, and to regulate trading practices in the interests of both buyers and sellers. To date similar protections have been lacking in most contractual negotiation.

Possible Directions to Take

Which of several possible directions U.S. agriculture will take will depend in large measure on what actions, both public and private, are chosen to influence them. Assuredly, the methods of production will acquire ever more industrial characteristics. The moot issue is whether agricultural institutions (the way agriculture is organized and managed) will go the same route. Chances are that in the absence of specific action, they too will drift into industrial forms.

Decisions will be made not so much on economic as on other grounds. To a large extent they will be based on what kind of agriculture and rural life is desired for its own sake. Few research data are to be found on whether a different kind of agriculture would be more productive than the traditional kind. Yet it seems that productivity is so high, and resources are so great, that any of several forms of organization would provide adequately — even though not equally — for the food and fiber needs of our consuming population. The test is not so much economic as what our other goals and values may be.

If the public decision should be to preserve traditional agriculture in preference to an agriculture organized along the lines of industry, several courses of action lie open. Some would be private, and others would require either enabling authority or direct help from government. The following are presented as examples from which selection could be made. They are a partial catalogue, not a blueprint. No one of the measures, singly or combined, will change the technology of agriculture in a radical manner, nor will it arrest the steady pressure for more regular and orderly marketing of farm products. Most measures would be compromises. They would reconcile the more industrial character of agricultural production with some of the time-honored institutions of agricultural organization.

1. Step-up in educational services to farmers. More of such services would be on-the-farm, and they would frequently be highly specialized and include detailed managerial counsel. Some would be private and some public, but experiment stations and extension services would likely continue to anchor them, chiefly in the interest of third-party objectivity.

2. Better sources of financial capital to farmers. It would be ideal if more equity capital could be brought into agriculture under terms that allowed managerial responsibility to remain within agriculture.

3. New arrangements for farm ownership and tenure. A recent article in *Illinois Agricultural Economics* called attention, for example, to "growth in farm operating partnerships, farm family corporations, and multiple-landlord, tenant-operated farms."[5] A well-financed tenant who holds an equitable rental contract

[5] F. J. Reiss, R. C. Hughes, and G. G. Judge, Changes in Farm Tenure: A Markov Process Analysis. Ill. Agr. Econ. 3(2):10. 1963.

may be a sounder position than an owner-operator on a farm with too small an acreage and too big a debt. Farmers and farm families may need to revise their age-old goal of debt-free, full ownership. At present dollar costs of land the human cost of that goal may be too high. It may require too much sacrifice by the farm family.

4. New or enhanced forms of farmer cooperation. Some persons believe that this holds bright promise. Farmers would retain their managerial control over their farm operations but would depend on pooled selling. Purchasing would likely be similarly combined. This avenue would call for some new concepts of the nature and form of cooperation. It might require more legislative authority, carefully spelled out according to the terms and limits to its use.

5. Cooperative marketing under orders and agreements. Experience shows this aid to marketing to be of value under certain conditions. To date it has appeared best suited to specialty crops. Whether it is adaptable to some livestock products is not clear, but it is probably better suited to them than to field crops. Whatever the boundary to their possible application, marketing orders and agreements have won their place in the roster of aids to the marketing of farm products.

6. Cooperative bargaining associations. The times and places to which these are applicable is also a matter of uncertainty. They probably offer more promise than their opponents will admit, but less than their proponents claim.

7. Legal aids of various kinds. Here also the possibilities are too numerous for mention. As more contracts are used, legal protection of the terms of contract will almost surely prove necessary. The institutions of agriculture have long had the benefit of protective legislation, and they will continue to need that help. Legal "sideboards" may be the only feasible way to permit the kinds of agriculture that are desired, and to forestall those that are not.

These seven examples certainly do not exhaust the possible means of achieving whatever the democratic decision-making process determines to be the desired makeup of U.S. agriculture. They are the ones that have been proposed most often by farm leaders, and by farm economists who have studied the nature and the meaning of the forces born of industry that are now pressing upon the traditional agriculture of the United States.

Should Workmen's Compensation Apply to Illinois Farmers?

N. G. P. KRAUSZ

THE THEORY BEHIND workmen's compensation acts is said to be: "The cost of the product should bear the blood of the working man." The Illinois legislature enacted the first workmen's compensation law in 1911, modeling the act after the British act of 1897. Basically the Illinois act provides for an insurance system to compensate employees for work-connected injuries. The act provides for medical, surgical, and hospital services, with fixed payments during temporary disability, and an award in money as compensation for permanent injuries or death.

Most of the workmen's compensation acts in the states exempt employers of agricultural labor from mandatory coverage. However, because of the high farm accident rate in recent years, the question again arises whether workmen's compensation should apply to Illinois farmers.

Farming parallels industry in the use of heavy and potentially dangerous machinery. Statistics of the National Safety Council bear this out. In 1962 there were about 13,700 accidental deaths in all kinds of work in the United States. Almost one-fourth of these (3,100) involved farm workers.

In Illinois an estimated 825 farm people were killed in accidents in 1962. This includes accidents on the farm, in the home, and off the farm (such as highway accidents). The on-farm fatal accidents in Illinois totaled over 100 for 1962, and disabling on-farm injuries were estimated to be 6,900.

The accidental death rates and numbers of disabling injuries for major U.S. industries in 1962 are shown in the tabulations below (death rates include fatalities both on and off work site, and disabling injuries are those which cause more than one day of absence from work). Estimates are based on information from "Accident Facts," published by the National Safety Council.

Industry	*Death rates per 100,000 workers*
Mining, other extractive	110
Construction	73
◆ Farming	60
Transportation and Public Utilities	40
Service and Government	15
Manufacturing	11
Trade	10

Industry	*Disabling Injuries*
Service and Government	500,000
Manufacturing	400,000
Trade	375,000
◆ Agriculture	280,000
Construction	210,000
Transportation and Public Utilities	190,000
Mining, Quarrying, Oil and Gas Wells	45,000
Total	2,000,000

The Law in Illinois

Illinois law exempts farmers from the mandatory application of the act.[1] However, where a farmer owned a large tract of timber land and operated a saw mill, retaining some lumber for his own purpose and selling the rest, it was held that the operation of the saw mill was within the compensation act and the exemption

[1] "Nothing contained in this act shall be construed to apply to any work, employment or operations done, had or conducted by farmers and others engaged in farming, tillage of the soil, or stock raising, or to those who rent, demise or lease land for any such purposes, or to anyone in their employ or to any work done on a farm or country place, no matter what kind of work or service is being done or rendered." Ill. Rev. Stat., C. 48, s. 138.3(15).

did not apply. The Illinois Supreme Court pointed out that "it cannot be said that because a man is a farmer that fact, alone, exempts him from the operation of the Workmen's Compensation Act where he engages on his farm in an independent extra-hazardous occupation which is within the terms of the act."[2]

The court has been faced with difficult cases. In *Hill v. Industrial Commission,*[3] a farmer owned a threshing outfit with a clover-hulling attachment, and while hulling clover for his neighbors one of his employees was injured. The injury was held not to be compensable under the Workmen's Compensation Act.

In *Seggebruch v. Industrial Commission,*[4] the employer owned a farm, a grain elevator, and a flour and feed store. He also retailed sand, gravel, and brick, and even ran a saloon. An employee did every kind of work except office work, and while he was unloading manure on the farm of the employer he was injured. The Supreme Court said that, although at times in the year he was engaged in extra-hazardous activities (running the elevator), spreading manure did not bring him within the protection of the statute.

The tendency toward a liberal construction of the farmers' exception under workmen's compensation is apparent from the Illinois Supreme Court decision in *Noverio v. Industrial Commission.*[5] Here the employee of a man in the business of laying and repairing the tile lines on farms was said to be within the exception even though the employee was injured while cutting a tile drain cover in his employer's basement. The courts said that "no work could be more fundamentally a part of farming than drainage to put the soil in shape for cultivation. That the work was being done by one not engaged in general farming himself is immaterial. . . . The adjournment to the employer's basement was obviously to facilitate the completion of an integral part of the drainage system that was in process of installation on the farm and the character of the work was in no sense altered thereby."

The extent of the exception can be best summarized by a statement in the syllabus to the Court of Claims case of *Bunting v. State.*[6] "All farm work done by farmers and others engaged in farming, tillage of the soil or stock raising and all work done, which in its nature is a part of farming, or any work done on a farm or country place, no matter what kind of work or service is being done or rendered, is excepted from the provisions of the Workmen's Compensation Act."

Other States

Ohio is one of the few states of the union that has no agricultural labor exemption in its Workmen's Compensation Act.[7] Under the Ohio law, anyone who employs more than three persons must carry workmen's compensation. However, the requirement that any employer (including farmers) must have at least three employees, in effect, is an exemption for most farmers. Only the larger farm operators would come within the purview of the act.

The decided majority of states have provided agricultural exemptions in their acts similar to the exemption in the Illinois act. However, interpretation of these exemptions may be more limiting in some of the nearby states.

In Michigan "farm laborers" are exempted from the statute, but the Supreme

[2] Peterson v. Industrial Commission. 315 Ill. 199 (1924).

[3] 346 Ill. 392 (1931).

[4] 288 Ill. 163 (1919).

[5] 348 Ill. 137 (1932).

[6] 11 Ill. Ct. Claims 181 (1938).

[7] For a summary of the treatment given agricultural labor in the workmen's compensation acts of the different states, see 1 Larson, "The Law of Workmen's Compensation," sec. 53.10 (1952).

Court of that state held that an employee of a farmer who owns a corn husking machine used at the time of injury on the farm of a neighbor, whether or not for hire, is not a farm laborer within the act of that state.[8]

The Indiana statute exempts "farm or agricultural laborers and employees. . . ." However, an Indiana court has held that "one who operates hazardous farm machinery (in the case cited, a corn picker) on the farm of a farmer who is not his employer, under contract existing between the farmer and his employer, is not a farm laborer."[9]

The situation in other north-central states, however, is similiar to that in Illinois. Minnesota law excludes "farm laborers," and the Supreme Court of that state said that an employee operating a threshing machine was within the exception.[10] Iowa has decided similar cases in the same way.[11]

Illinois Election

Even though farmers are exempt from mandatory coverage, it is still possible for them to elect to come under the act. This can be done by filing notice of such election with the Industrial Commission, *or* by insuring liability to pay compensation under the act with an insurance carrier authorized to do business in this state.[12]

If an employer elects to come under workmen's compensation, then every employee is deemed to have accepted all the provisions of the act as a part of his employment contract. If the employee does not want to be covered, he can file a notice of his intention with the Commission within 30 days after the date of his hiring. The Commission must immediately notify the employer of the rejection by the employee. After this has been done, the measure of the employer's liability for work-connected injuries will be determined without reference to the act. Such an employer would then be free to cancel any insurance policies purchased pursuant to the act.

Also, employees can withdraw from the operation of the act by filing a notice with the Industrial Commission at least 10 days before January 1 of any year. In the event the farmer would want to withdraw from the act, he could do so by filing a notice with the Commission at least 60 days prior to the expiration of any calendar year.[13]

Where the farmer has elected to come under the act by *insuring* his liability, he can withdraw from the operation of the act at the date of expiration or cancellation of the insurance policy.[14]

Assuming that an election to come under the statute has been made, there are three ways set out to insure payment of compensation. The employer can:

1. File with the Commission an application for approval as a self-insurer. This application must show the financial statement of the employer. Whether or not the employer will be accepted as a self-insurer is at the discretion of the Industrial Commission, based on "financial ability."

2. Furnish security, indemnity, or a bond guaranteeing the payment by the employer of the compensation provided.

3. Insure his entire liability to pay compensation to some insurance carrier licensed to do such business in Illinois.[15]

Advantages

The following are advantages of workmen's compensation for farmers.

[8] Roush v. Heffelbower. 225 Mich. 664, 196 NW 185 (1923).

[9] 127 Ind. app. 370, 141 NE2d 863 (1957).

[10] Bykle v. Dist. Court of Watonwan Co. 140 Minn. 398, 168 NW 130 (1918).

[11] Sylcord v. Horn. 179 Iowa 936, 162 NW 249 (1917).

[12] Ill. Rev. Stat. 1963. C. 48, s. 138.2.

[13] *Ibid.*

[14] *Ibid.*

[15] Ill. Rev. Stat. 1963. C. 48, s. 138.4.

1. The employer's liability is limited. The Workmen's Compensation Act states what the maximum recovery could be. For example, the maximum for death would be $13,500 if the deceased had no children, and $17,500 if there were four or more children. There are limits for an injured employee, with elaborate schedules set out in the law.[16]

With a standard-type general liability policy, a court judgment may exceed the amount of insurance carried. The difference would have to be paid by the farmer. The Illinois "wrongful death" statute provides for a maximum recovery of $30,000, but there is no limit for injuries.

2. The second advantage is social desirability of added security for employees in a relatively high-accident-rate business. Often the employee is injured through his own negligence, and without workmen's compensation he generally cannot recover. The employer would be under no legal liability and could simply discharge the injured employee.

A farmer often feels morally obligated to help his injured employee, but due to his own financial burden finds himself unable to do so. An extended insurance or a workman's compensation program would solve this problem.

Disadvantages

On the other side of the ledger are high cost and limited coverage.

1. The cost of workmen's compensation is borne by the employer. It cannot be deducted from the employee's wages. Any employer withholding any amount for the purpose of paying a workmen's compensation insurance premium can be subject to a fine of $10 to $1,000 or six months' imprisonment in the county jail, or both fine and imprisonment.[17]

To compare the cost of workmen's compensation coverage with employer's liability insurance, a hypothetical farm is used: 240 acres with 160 acres of grain, 40 acres of hay, 40 acres of pasture, 20 head of dairy cattle, 30 beef cattle, 10 sheep, and 20 hogs. A farm family with two employees conduct the farming operation.

Liability coverage is assumed to be $100,000 maximum so that costs may be more accurately compared. The costs of workmen's compensation and employer's liability insurance from five companies are:

Company	*Workmen's compensation*	*Employer's liability*	*Difference*
A.....	$273.44	$196.56	$ 76.88
B.....	373.00	211.00	162.00
C.....	283.44	193.90	89.54
D.....	273.44	196.56	76.88
E.....	283.44	80.20	203.24

2. The second disadvantage is that workmen's compensation is limited to employees injured or killed in situations arising out of and in the course of their employment. Newer farm liability policies (not workmen's compensation) generally give broader protection to include injuries to business visitors and other persons coming on the premises, as well as protection to the farmer for injuries to his employees.

It must be kept in mind, however, that aside from limited medical payments payable under liability policies, compensation for injuries to employees depends on evidence that the employer was negligent in some way and thus caused the injury and that the employee was not negligent.

Comment

The statement has been made that farmers are availing themselves of the right to come under workmen's compensation in increasing numbers,[18] but conversations with insurance representatives

[16] *Ibid.*, s. 138.7.

[17] Ill. Rev. Stat. 1963. C. 48, s. 138.4.

[18] 40 Ill. Bar Journal 700 (1952).

do not indicate such a trend. A survey of 10 insurance agencies revealed that only one had ever written a workmen's compensation policy covering a farmer. The one farmer who was covered had a farm-related business operation in the city.

Farm labor today is subject to a high accident incidence, and when an injury or death occurs, the hardship on a farm laborer is just as severe as on an industrial worker. Although there are administrative problems connected with workmen's compensation, and it is expensive, one could argue that some additional protection for injuries is needed for farm employees. Farm labor is in short supply, and this would, to some degree, place farm employers in a better competitive position to attract workers.

Educational and Vocational Needs of Rural Youth: A Pilot Study

D. E. LINDSTROM[1]

TODAY "9 out of every 10 farm-reared boys have no other choice but to find employment off the farm."[2]

"In comparison with men who are reared in urban areas, farm-reared men are disproportionately represented in lower prestige and less well-paying jobs. One reason for these consistent differences has been the lower educational levels among farm men: 11 years on the average for the urban, 9 years for the rural nonfarm, and 8.6 years for the farm male."[3]

"Over half of the rural farm males 16 to 24 years of age in the civilian labor force in 1959 not enrolled in school failed to graduate from high school; 61 percent of the farm residents lacked a high school education."[4]

These quotations point up three aspects of the dilemma facing rural youth in our country.

A 3-part study is now being carried on to reveal the educational and vocational needs of rural youth in Illinois, including (1) a pilot study in Sullivan, Illinois, (2) an analysis of test and environmental data on hand in the Illinois High School Testing Program files on juniors and seniors in 24 rural schools in eight counties[5] that had given the Illinois High School Testing Program tests, and (3) a study based on tests and environmental and occupational choice data in all 36 high schools in these eight counties (Carroll, Mercer, Marshall, Moultrie, Calhoun, Franklin, Alexander, and Pulaski). This article discusses the problems and summarizes our findings so far.

The problems facing rural youth in these eight counties are almost as acute as those in the country as a whole. Of 2,326 juniors and seniors in 24 high schools in 1962-63, almost 60 percent did not plan to go to college. More girls than boys did not plan to go to college: 66

[1] Hazel M. Chambers, University of Illinois Department of Agricultural Economics (Rural Sociology), rendered valuable assistance in statistical work and preparation of the manuscript.

[2] Edward W. Aiton, Myth and Myopia — Blocks to Progress. Ext. Serv. Rev., U.S. Dept. Agr. p. 140. Aug., 1963.

[3] Lee G. Burchinal, Farm vs. Nonfarm Youth in the Urban Labor Market. *Op. cit.*, p. 144.

[4] James D. Cowhig, Early Occupational Status as Related to Education and Residence. Jour. Rural Soc. 27:18. Mar., 1962.

[5] The eight counties are those in eight geographical areas of the state with rural area development committees. These counties may be taken as representative of rural counties in the state as a whole.

Table 1. — College Plans of 2,326 Seniors and Juniors in 24 Rural High Schools in 8 Counties in Illinois, 1962

	Males			Females		
	Farm	Nonfarm	Farm and nonfarm	Farm	Nonfarm	Farm and nonfarm
Number who plan to go to college.....	132 (42.6%)	427 (48.2%)	559 (46.7%)	91 (30.6%)	290 (34.9%)	381 (33.7%)
Number who do not plan to go to college.....	178 (57.4%)	459 (51.8%)	637 (53.3%)	206 (69.4%)	540 (65.0%)	749 (66.3%)

percent of 1,130 girls and 53 percent of 1,196 boys (Table 1). More farm than nonfarm youths had no plans for college: 63 percent of the farm and 58 percent of the nonfarm. More of the farm girls than farm boys said they did not plan to go to college: 69 percent of the farm girls and 57 percent of the farm boys. Also, more of the nonfarm girls than nonfarm boys had no college plans: 65 percent of the nonfarm girls and 52 percent of the nonfarm boys.

Problems Facing Those Without College Plans

The fact that almost 60 percent of these rural young people in various categories did not plan to go to college presents educators, parents, and citizens with serious problems, especially since most of these youths must find jobs outside the community in which they live. Problems of employment and further training therefore should be of grave concern to employers outside as well as inside the communities in which these young people have been getting their education. These problems are all the more acute in view of the fact that in Illinois about one-fourth of the high school students drop out before they graduate.[6] The seriousness of the problem is pointed up by a study now being made by the employment service in St. Louis, which showed that they normally process 2,000 in-migrants a week, most of whom are rural migrants and come without resources or skills.[7]

Traditionally in our school systems we have been concerned most about training high school students for college. Yet in the Sullivan group only a little over half (52 percent) planned to go to college. About 64 percent of the boys and only 41 percent of the girls had such plans (Table 2). Of those not planning to go to college, one-fourth of both the boys and girls did not know what they were going to do, and almost two-fifths planned to attend trade or business school (38 percent of the boys and 49 percent of the girls). About one-third of the boys planned to go into the army or skilled jobs, and only 3 percent planned to farm. A little over one-fourth of the girls planned to be homemakers or go into clerical, sales, or service occupations.

Preparation for a Job

Very few of those not planning to go to college felt prepared to take a job. Ninety percent of the boys and 81 percent of the girls reported that they needed more preparation and training. Here is evidence that plans must somehow be made to take care of these "forgotten" boys and girls, as well as those who drop out of high school. They may need a special kind of training that is both vocational and cultural.

[6] David M. Jackson and William M. Rogge, Identification of Potential High School Dropouts. Office of State Supt. Public Instruction, Springfield, Ill. 1963.

[7] Kathryn Close, Facts and Myths About Rural Youth, in "Children." U.S. Dept. Health, Educ., Welf., Children's Bureau. p. 233. Nov.-Dec., 1963.

Table 2. — College Plans of 160 Seniors and Juniors in Sullivan, Illinois, High School, 1962

	Male	Female
Number who plan to go to college.....	51 (63.7%)	33 (41.2%)
Number who do not plan to go to college.....	29 (36.2%)	47 (58.7%)

Preferred Place to Live

No matter what type of training they go after — college or other — most of these young people (about three out of four) want to live in the country or in a small town. In view of this desire, one may well ask what in the way of occupations such small places can offer these young people or whether their expectations have any foundation. Although more than 75 percent prefer the country or small town, only 3 percent of the boys and none of the girls would choose farming as their occupation.

Preferences as to Self-Employment

Boys and girls differed in whether they would prefer to work for themselves or for others: 63 percent of the boys choosing college and 76 percent of those not choosing college preferred self-employment. But 73 percent of the girls choosing college and 57 percent of those not so planning preferred working for others. Although 79 percent of the boys planning to go to college wanted managerial or professional jobs, only 41 percent of those without college plans wanted such positions.

Some Unanswered Questions

If these findings are considered to be representative of young people in a good farming territory, one can only conclude that there is a great deal of uncertainty among students from rural areas coming out of high school, even in the best areas.

One may well ask, since the majority do not plan to go to college, whether we need not be more concerned about those not planning to go to college. Should special plans be made for these youths, and for those who drop out, to receive training after they leave high school? The data in this study indicate that such plans should be made. The question is: What type of training should it be?

The answer hinges on the capabilities and interests of the boys and girls in these groups. Do those who choose not to go to college differ in intelligence, competence, and personality from those who plan to go? Such information could help guide us in providing the kinds of training the majority of our rural young people, those not planning to go to college, need in order to be prepared for their lifework.

So far we have only indications of what these differences are, and much of what we have is limited to the data from the Sullivan sample. We hope the data obtained from students in schools in the other seven counties will give more complete answers.

The research reported here was designed to test the hypotheses that (1) the majority of farm-reared boys and girls have aptitudes and potential skills best fitting them for technical and artisan occupations, including those related to agriculture, and (2) the personal and socio-psychological characteristics of these young people are such that they would find the best possible satisfaction in life from these pursuits.

Differences in Achievement Scores

A comparison of educational scores for students planning to go to college with those not planning to go to college is presented in Table 3. Except for mechanical aptitude in boys, the students planning to go to college had significantly

Table 3. — Mean Educational Achievement Scores for 160 Seniors and Juniors in Sullivan, Illinois, High School, 1962[a]

Variables	Group A^M compared with Group B^M	Group A^F compared with Group B^F
Abstract reasoning.....	38.95_{xxx} 33.29	38.90_{xx} 32.18
Verbal reasoning.....	33.54_{xxx} 24.62	35.93_{xxx} 25.25
Total scores on verbal and abstract reasoning	72.50_{xxx} 57.92	74.84_{xxx} 57.44
Natural science reading..	37.16_{xxx} 28.18	35.75_{xxx} 27.51
Social science reading....	35.81_{xxx} 29.62	37.06_{xxx} 30.04
Writing achievement....	50.29_{xxx} 41.55	55.62_{xxx} 45.51
Writing correctional error	13.95_{xx} 18.00	9.62_{xxx} 16.39
Writing functional error..	4.68_{xxx} 9.07	3.71_{xxx} 6.97
Mechanical aptitude....	47.15 46.26	39.00_{xxx} 30.38

[a] The following applies to this and all subsequent tables:
Group A^M = 51 boys who plan to go to college
Group A^F = 33 girls who plan to go to college
Group B^M = 29 boys who do not plan to go to college
Group B^F = 47 girls who do not plan to go to college
Using "t" test of differences between mean scores:
x significant at .05 level
xx significant at .01 level
xxx significant at .001 level

higher scores than those not planning to attend college. There is no evidence that the mechanical aptitude of boys not planning to attend college is different from those who plan to attend.

Differences in Personality Characteristics

In a comparison of those planning to go to college and those not so planning in both male and female groups, the IPAT 16 P.F. test was used (Table 4).[8] For the males, only three of the 16 factors showed significant differences. Those planning to attend college were more enthusiastic and talkative, more sensitive and effeminate, and more self-sufficient and resourceful than those not planning to attend. Although there were no significant differences between the two groups of boys on the dull, low-capacity to bright, intelligent continuum, there was a significant difference between girls who planned to go to college and those who did not; the former tended to be brighter and more intelligent. Girls planning to go to college also were more confident and unshakable than those not so planning. In the glum, silent to enthusiastic, talkative continuum as well as the tough, realistic to sensitive, effeminate one, the significant differences between the two groups of girls paralleled the results of the boys' tests.

Differences in Environmental Factors

Considering environmental factors, statistically significant differences were evident between those who planned to go to college and those who did not.

Parents of boys and girls who planned to go to college had significantly higher educational attainment than did the parents of those not planning to go to college (Table 5).

The socio-economic status[9] of the families of boys and girls who planned to go to college was higher than that of those who did not plan to go (Table 6).

Differences in Aspirations of Youth

There were significant differences between boys and girls who planned to go to college and those who did not in what they expected from an occupation. Each of the eight items in Table 7 was assigned a rank of from one to eight. Boys planning to go to college attached greater importance to "status and prestige" in an occupation than did boys who did not plan to go. The results also suggest that

[8] Raymond B. Cattell and Glen F. Stice, The Sixteen Personality Factor Questionnaire. Institute for Personality and Ability Testing, Champaign, Ill. 1962.

[9] Using the socio-economic status scale devised by W. H. Sewell. See "A Short Form of the Farm Family Socio-Economic Status Scale," in Jour. Rural Soc. 8:161-173. 1943.

Table 4. — Mean Scores of 16 Personality Characteristics of the Personality Factor Tests[a] for 160 Seniors and Juniors in Sullivan, Illinois, High School, 1962[b]

Low score description	High score description	Group A^M compared with Group B^M	Group A^F compared with Group B^F
Aloof, cold	Warm, sociable	4.78 4.86	6.00 5.61
Dull, low capacity	Bright, intelligent	6.90 6.51	6.60_{xx} 5.46^{xx}
Glum, silent	Enthusiastic, talkative	6.11_{xx} 4.82^{xx}	6.54_{x} 5.40^{x}
Timid, shy	Adventurous, thickskinned	5.15 4.34	5.57 4.87
Tough, realistic	Sensitive, effeminate	5.80_{xx} 4.34^{xx}	6.39_{x} 5.12^{x}
Conventional, practical	Bohemian, unconcerned	5.43 5.75	5.00 5.55
Confident, unshakable	Insecure, anxious	5.64 6.10	5.12_{x} 6.06^{x}
Dependent, imitative	Self-sufficient, resourceful	5.13_{x} 6.31^{x}	4.51 5.02
Phlegmatic, composed	Tense, excitable	6.15 6.58	5.48 5.89
Emotional, unstable	Mature, calm	4.88 4.37	5.03 5.19
Submissive, mild	Dominant, aggressive	5.52 4.89	5.15 4.63
Casual, undependable	Conscientious, persistent	4.98 4.86	5.12 5.31
Trustful, adaptable	Suspecting, jealous	6.11 6.34	5.75 6.06
Simple, awkward	Sophisticated, polished	4.64 4.17	4.45 4.72
Conservative, accepting	Experimenting, critical	5.35 4.82	5.00 4.89
Lax, unsure	Controlled, exact	5.47 5.20	4.96 4.95

[a] The range of what may be called average or "normal" scores lies between the mean scores of 5 and 6.
[b] See footnote under Table 3 defining groups and indicating levels of significance.

boys who planned to go to college assigned greater importance to "opportunity to be boss" than boys who did not plan to go.

Parental Desires for Youth

Fathers of 70 percent of those planning to go to college aspired toward professional or semi-professional occupations for their sons, whereas only about 50 percent of the fathers of those not planning to go to college had such plans for their sons. More than two-thirds of the mothers in the former group, compared with less than one-third of those in the latter, wanted their sons to go into professional and semi-professional work.

Percentages of the young people who had the help of parents or relatives and high school counselors in making their decisions were highest for those with college plans. About 43 percent of the boys planning to go to college discussed careers (lifework) and 51 percent discussed jobs (what to do after graduation) with parents or relatives, while the respective percentages were only 21 and 31 percent for boys without college plans.

Table 5. — Mean Educational Level of Fathers and Mothers of 160 Seniors and Juniors in Sullivan, Illinois, High School, 1962[a]

Mean educational level	Group A^M compared with Group B^M	Group A^F compared with Group B^F
Father	4.37_{xxx} / 3.03	4.00_{xxx} / 2.19
Mother	4.29_{x} / 3.34	4.09_{xxx} / 2.75

[a] See footnote under Table 3 defining groups and indicating levels of significance.

Table 6. — Mean Socio-Economic Status for 160 Seniors and Juniors, in Sullivan, Illinois, High School, 1962[a]

	Group A^M compared with Group B^M	Group A^F compared with Group B^F
Mean socio-economic status	6.45_{xxx} / 5.65	6.12_{x} / 5.51

[a] See footnote under Table 3 defining groups and indicating levels of significance.

Table 7. — Mean Ratings[a] for 8 Aspirations in an Occupation for 160 Seniors and Juniors in Sullivan, Illinois, High School, 1962[b]

Aspiration	Group A^M compared with Group B^M	Group A^F compared with Group B^F
Friendly co-workers	4.14 / 4.37	3.21 / 3.68
Status, prestige	4.14_{x} / 5.44	5.39 / 5.17
Good salary	1.94 / 2.13	2.72 / 2.74
Opportunity to be boss	5.52_{xxx} / 4.27	6.81 / 7.29
Security	3.40 / 3.65	3.15 / 3.08
Fair and considerate boss	4.84 / 3.75	4.75 / 4.42
Challenging and interesting work	2.76 / 2.72	2.33 / 2.89
Chance to express own ideas	4.74 / 4.96	4.87 / 5.00

[a] A lower mean score signifies a higher rating of the item.
[b] See footnote under Table 3 defining groups and indicating levels of significance.

Among the girls, 39 percent of those planning to go to college and only 25 percent of those not so planning had such discussions. Relatively few of the boys went to their high school counselors: only 20 percent of those planning to go to college and 17 percent of those not so planning. The respective percentages for girls who had visited their counselors were higher: 33 and 36 percent. It is evident that most of these youths had little counseling.

Lack of finances and lack of skill or education seemed to keep almost two-thirds of the boys and from one-third to two-fifths of the girls from choosing what they wanted to do, which for most, as we have seen, was to get additional training.

There was a difference between boys choosing to go to college and those not so choosing in what aptitudes or interests most influenced their decision: 64 percent of the boys choosing college liked working with people and ideas, whereas 65 percent of those not so choosing liked working with machinery, thus indicating a greater likelihood of success in technical or artisan occupations. As for the girls, 79 percent of those planning to go to college and 72 percent of those not so planning liked working with people.

Some Implications

What do the facts of this study mean? One implication is the need for guidance programs to aid young people in making life choices that not only will make them the most efficient and productive members of the society of which they become a part, but will give them a satisfactory lifework and a sense of doing something of importance and value.

Effective guidance, however, is not enough. We know from data released by the U.S. Department of Labor that unemployment is a chief source of anxiety,

with almost 6 percent of our labor force unemployed in 1963. This rate was higher than in West Germany, Japan, Sweden, France, Great Britain, and Italy. Most of the unemployed are unskilled and poorly trained. From their ranks come most of those on relief, which in four Illinois counties are over 17 percent of the total population. Numbers of workers in occupations that require the most education and training have grown most rapidly: professional and technical workers; clerical, sales, and service workers; skilled workers; proprietors and managers; and operators, in that order. Farmers and farm workers have decreased most rapidly.[10] All agencies in the community need to be aware of these changes in order to be as well prepared as possible to guide youth into useful and expanding fields of occupation.

The provision of training opportunities for rural boys and girls who leave high school, by graduation or otherwise, is a matter of grave concern to all citizens. In talking with school superintendents and principals in the eight counties regarding our study, one is impressed with the feeling of frustration held by these people. There was no place to which they could advise these youths to go for training. Several felt that, in addition to the need for new and different institutions for those leaving high school and not planning to go to college, many boys and girls now in school would do much better if they could get training more suited to their capabilities, interests, and aspirations.

There is widespread discussion about what such institutions should be like and how they should be supported. Since so many youths must leave the rural community to find useful occupations, it is apparent that their training facilities should be supported primarily from state and federal sources. A boy trained in electronics, for example, may find his lifework in a factory or plant in a state many miles from his home community.

It should be remembered also that the problem is not one of vocational training alone. There must also be cultural training — for living, for life in a different environment, and for citizenship and world affairs. This kind of training is best given when young people begin to face adult responsibilities, when they seriously consider what they will choose as a lifework. It should be made available in centers designed for helping these young adults, where anyone can receive the type of training suited to his capabilities and interests. This is a big order, but we must face up to the need if we are to reduce the number of misfits coming out of our rural society, and the misery attendant upon such lives.

A basic change, finally, must come in attitudes toward jobs. People must be educated to regard any job, if it contributes to the wealth and well-being of our society, as an important job. Being a good electrician, plumber, house builder, or any other artisan or skilled person should carry with it pride in good work and appreciation from our interdependent and complex society for that good work. Here, also, is a tremendous task facing our schools, churches, and communities.

[10] "People, Skills and Jobs," Manpower Commission, U.S. Dept. Labor. 1963.

Soil Loss Tolerance and the Economics of Soil Conservation on Swygert Soils

C. E. HARSHBARGER and E. R. SWANSON

THE CENTRAL PROBLEM in the economics of soil conservation is to balance present and future needs for the soil resource. The question is not whether to conserve, but the level of conservation. Further, the possibility exists that the views of individual farmers concerning the correct balance between present and future needs are different from the view held collectively by our society. The latter finds expression in a number of ways.

In this study, the soil loss tolerance — "the maximum soil loss that can be tolerated and still achieve a degree of conservation needed to sustain economic production in the foreseeable future with present technology"[1] — is taken as the view of society regarding the appropriate level of soil conservation. The present value of discounted net returns of cropping plans over periods up to 50 years is used to express the viewpoint of an individual farmer.

In making land-use decisions, farmers seldom look beyond one generation, and frequently the planning horizon is even more limited by reason of tenure, age, or other considerations. The farmer must decide whether the delayed returns of the future are more valuable than returns that can be obtained more rapidly.

The concept of discounting future returns is important in making decisions of this nature. The discount rate establishes a time preference for the returns accruing from an investment over its useful life. A high discount rate normally favors plans that give higher returns in the early years of the planning period, whereas a low discount rate favors plans giving higher returns in later years. A zero rate would mean, for example, that $100 at any time in the future would be worth exactly $100 today. This article shows how discounting and the length of the planning horizon affect the individual farmer's economic choice of a cropping system on a soil type in northeastern Illinois.[2] These choices are then compared with the cropping systems consistent with soil loss tolerances. The amount of income sacrificed by farmers meeting soil loss tolerances is also presented.

Northeastern Illinois has approximately 2½ million acres of slowly permeable or "tight" soils.[3] The slow rate at which water moves through these soils can create serious farming problems. Moderate slopes are very susceptible to erosion due to this impermeability. The soils also tend to be drouthy because root penetration is impeded.

Swygert silt loam to silty clay loam (soil type 91), located principally in northeastern Illinois, is representative of a soil that is subject to severe erosion. It is a dark soil formed from thin silty loessial (windblown) material on compact, plastic calcareous (limey) glacial till.[4] Slopes usually range from 1 to 6

[1] William H. Bender, "Soil Erodibility and Soil Loss Tolerance," in Soil Loss Prediction for the North Central States (proceedings of a workshop attended by representatives of the SCS, ARS, state experiment stations, and extension services, Chicago). p. 21. 1962.

[2] C. E. Harshbarger, Selection of Crops and Soil Conservation Practices on Swygert Soils: A Study of the Influence of the Planning Horizon and the Discount Rate. Unpublished Master's thesis, University of Illinois. 1963.

[3] E. L. Sauer, J. L. McGurk, and L. J. Norton, Costs and Benefits from Soil Conservation in Northeastern Illinois. Ill. Agr. Exp. Sta. Bul. 540. p. 563. 1950.

[4] H. L. Wascher, R. S. Smith, and R. T. Odell, Livingston County Soils. Ill. Agr. Exp. Sta. Soil Rpt. 72. p. 27. 1949.

percent, and severe erosion occurs on those greater than 3 percent.

Mechanical conservation practices have varying degrees of effectiveness for controlling runoff. Well-planned and well-maintained grass waterways are indispensable. Contour farming is also effective in retarding soil losses. Terracing is questionable on Swygert soils unless the ridges are inspected following dry periods.

Method of Study

The budgeting method was employed in order to control a number of variables affecting yields, in particular, fertilizer. These variables were apt to give considerable difficulty in a statistical analysis of commercial farms in the area. Estimates of soil loss in tons per acre for eight rotations were made for two slopes (4 and 6 percent) of Swygert soils. The effect of contouring on soil losses was also estimated. Yield declines, if any, were calculated from these estimates of soil losses. To isolate the effects of soil loss on yield, and to prevent the substitution of fertilizer from obscuring the yield decline due to soil loss, fertilizer was assumed to be applied only in the amounts taken out by crop removals. The present values of the net returns from the various cropping systems were then calculated, using two different discount rates and planning periods up to 50 years.

Determining Amount of Soil Loss

In order to obtain yield estimates for each system for each year during the 50-year period, it was necessary to relate yields to annual soil loss estimates. Thus, the relation of a number of factors to soil loss were considered first. Considerable effort has been devoted to improving methods for predicting soil loss in farm conservation planning. A soil loss prediction equation has been designed to provide major improvements in localized soil loss prediction. The equation, upon which the soil loss estimates for the rotations are based, is as follows:[5]

$$A = RKLSCP$$

A is the average annual soil loss in tons per acre predicted by the equation. R is the rainfall-erosion index. K is the soil erodibility factor measured in tons per acre per unit of rainfall-erosion index for a slope of specified dimensions (9 percent, 73 feet long). C is the cropping management factor which combines the effects of crops, crop sequence, and the various management practices. L is the length of slope factor, S is the steepness of slope factor, and P is the erosion control practice factor. For this study, R = 170, K = .43, L = 200 feet, S = 4 percent and 6 percent, and C and P varied according to the rotation and conservation practice used.

The estimated annual soil losses based on this equation for eight rotations are presented in Table 1. These would, of course, vary from year to year. It should be kept in mind that we are dealing with a pure soil type and specific slopes. In reality, slopes will be variable and drainage patterns will create the possibility for gully erosion, and waterways and ditches will fill up with soil from adjacent areas. We deal here only with the problem of a single soil type at two slopes which approximate the range of slopes found on Swygert soils. As might be expected, soil losses are greater on the steeper slopes. The field losses for up-and-down cultivation on 4-percent slope range from 2.5 to 18.8 tons per acre. On slopes of 6 percent, the range of annual soil losses is from 5.4 to 29.2 tons per acre. Contouring generally reduces estimated annual losses by one-half for both slope groups.

[5] D. D. Smith, "History of Soil Loss Prediction and the New Equation," in Soil Loss Prediction for the North Central States (proceedings as described in footnote on page 18). p. 7.

Table 1. — Annual Soil Loss Estimates for Swygert Soils, by Rotation, Slope Group, and Method of Cultivation

Rotation	Up-and-down cultivation		Contouring	
	4% slope	6% slope	4% slope	6% slope
	tons per acre			
Continuous corn..	18.8	29.2	9.4	14.6
C-C-O (cl).....	11.8	18.4	5.9	9.2
C-C-SB-O (cl)....	13.6	21.1	6.8	10.5
C-SB-O (cl).....	11.8	18.4	5.9	9.2
C-C-SB-O-M.....	7.4	13.6	3.7	6.8
C-C-O-M.....	5.3	9.5	2.6	4.8
C-O-M.....	2.5	5.4	1.3	2.7
C-C-O-M-M.....	4.4	8.2	2.2	4.1

Estimates on the inches of annual soil loss per rotation acre are necessary for determining estimates of the annual yield reductions that result by exceeding soil loss tolerance.[6] These estimates may be obtained by dividing the estimated soil loss by the weight of an acre-inch[7] of Swygert.

For the study, it was assumed that moderate erosion had occurred prior to the beginning of the analysis and that 10 inches of the A horizon remain. The top 3 inches were assumed to be the A_1 horizon, and the remaining 7 inches (referred to as the A-B horizon) were assumed to be the A horizon which, with increasing erosion, became mixed with progressively more B horizon. The respective weights of an acre-inch for these two horizons of Swygert are 130.5 tons for A_1 and 145.5 tons for A-B. These weights divided into the estimates of annual soil loss in tons give an estimate of the annual soil loss in inches.

Initial Yields and Annual Reductions

As annual soil losses increase, it is expected that yields will decrease. Data published by the Soil Conservation Service provide a method for estimating these decreases in yields by relating them to annual soil loss.[8] Base yields of each major crop are selected for several soil types. These base yields assume a high level of management and an A and 0 (zero) slope and erosion class, respectively. To obtain a yield estimate for a particular soil type, the base yield for a given crop is adjusted for slope and erosion.

Figure 1 shows the influence of slope upon base yields. The percentage that these yields are reduced is directly proportional to the degree of slope. For Swygert soils with 4- and 6-percent slopes, base yields are reduced 3.2 and 5.4 percent, respectively. The percentage adjustment for erosion (Fig. 2) is inversely related to the depth of the A horizon. After the depth has been reduced to 7 inches, the adjustment factor increases. Figure 2 shows that the percentage reduction in base yields per inch of soil loss is 3.9 percent for the A_1 horizon and 4.7 percent per inch of soil loss for the A-B horizon.

To help clarify this discussion, an example is given. The base yields assumed for Swygert soils are 84 bushels, 33 bushels, 61 bushels, and 4.2 tons[9] per acre for corn, soybeans, oats and meadow, respectively. Assuming a 6-percent slope, the corn yield adjustment for slope is derived by multiplying the base yield by the appropriate slope reduction factor (5.4 percent).

$$84 \text{ bu.} \times .054 = 4.5 \text{ bu.}$$

Next, the yield adjustment for erosion

[6] The annual soil loss tolerance for Swygert soils recommended by the SCS is 3 tons per acre.

[7] Volume of a solid with surface of 1 acre and depth of 1 inch.

[8] L. J. Bartelli, Technical, Management, and Information Note, Soils No. 10, Soil Conservation Service, Champaign, Ill., June, 1960.

R. T. Odell, Measurement of the Productivity of Soils Under Various Environmental Conditions, Agron. Jour. 42:282-292. 1950.

[9] Bartelli, *op. cit.*, does not list a base yield for meadow. It was assumed to be 4.2 tons per acre from which slope and erosion adjustments were computed.

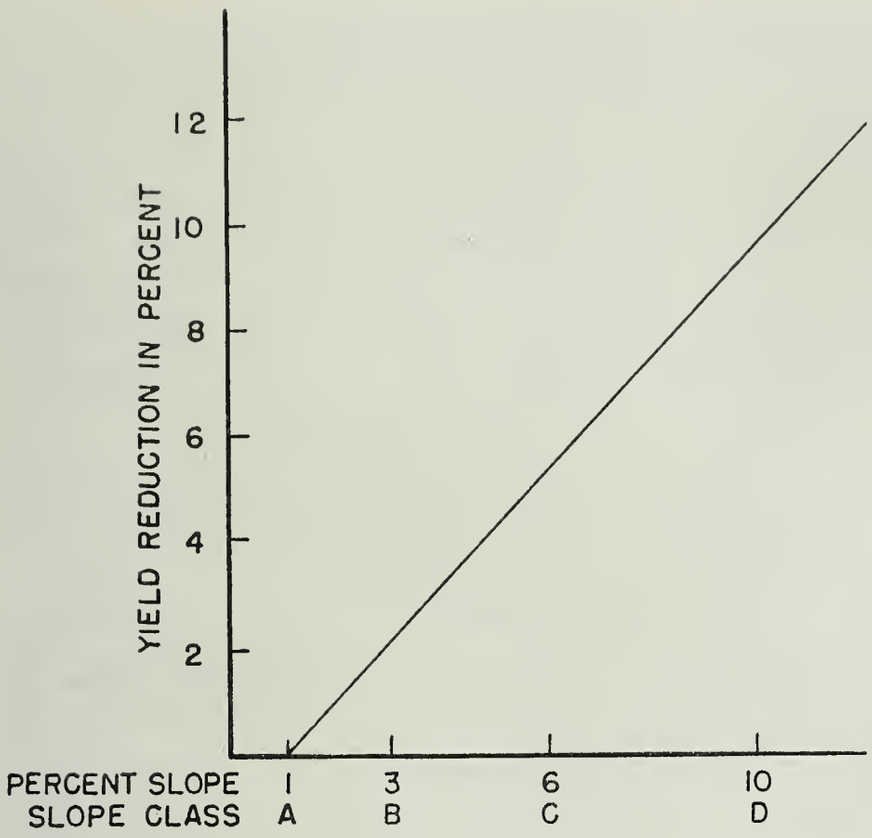


Fig. 1. — Percent yield reduction per unit of slope increase.

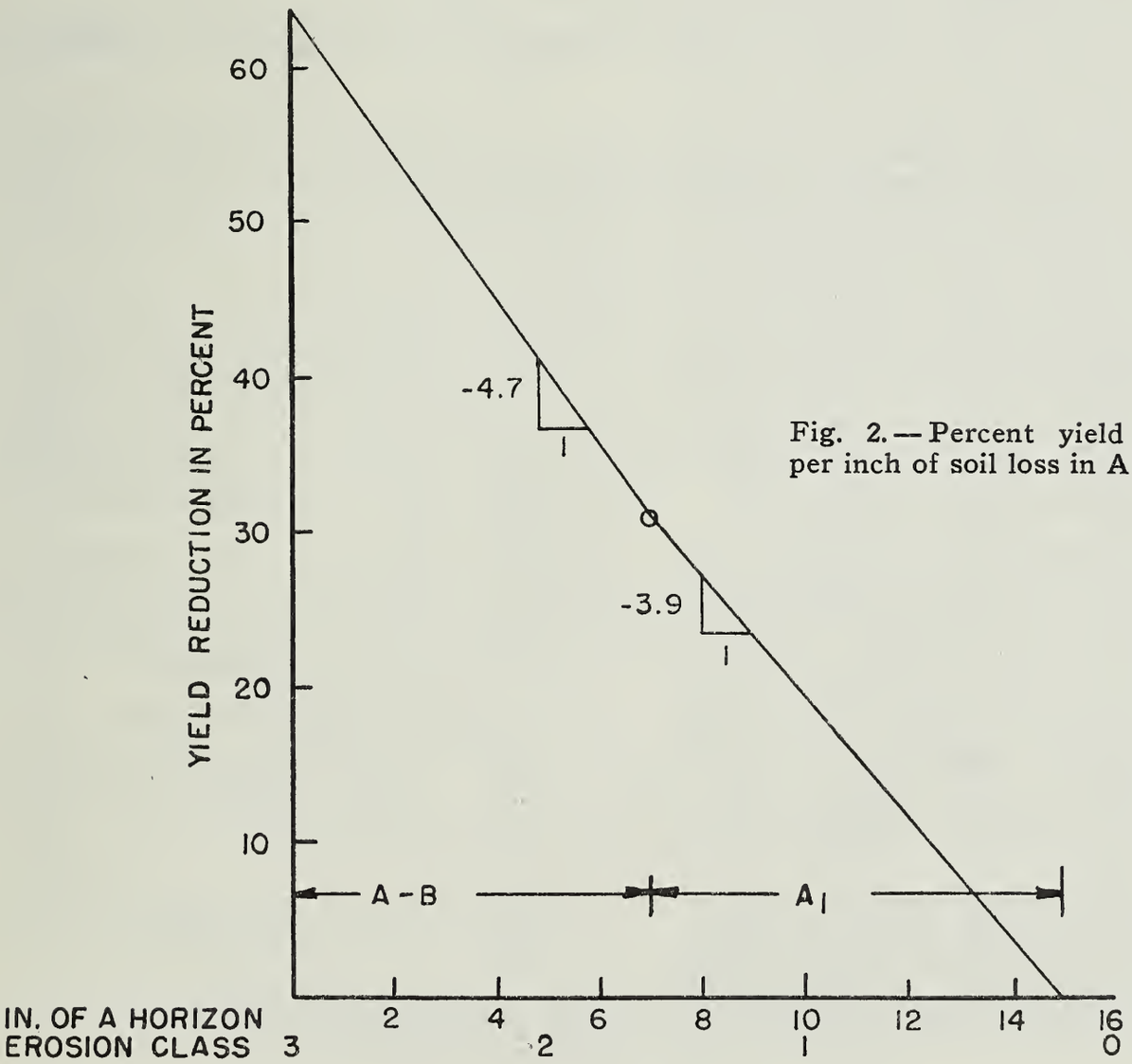


Fig. 2. — Percent yield reduction per inch of soil loss in A horizon.

is obtained by multiplying the base yield by the appropriate reduction factor.

A_1 horizon: 84 bu. × .039 = 3.3 bu. per inch of soil loss

A-B horizon: 84 bu. × .047 = 3.9 bu. per inch of soil loss

The adjustment factors for slope and erosion for the other crops are obtained by using the same procedure. They are:

	Slope		*Erosion*	
	4 pct.	*6 pct.*	A_1	*A-B*
Corn (bu. per acre)....	2.7	4.5	3.3	3.9
Soybeans (bu. per acre)	1.1	1.8	1.3	1.5
Oats (bu. per acre).....	2.0	3.7	2.4	2.8
Meadow (tons per acre)	.14	.23	.17	.20

When the erosion factors are multiplied by the inches of annual soil loss, the product represents an estimate of the annual yield reduction for that crop.

Bartelli's base yields are used to determine the absolute yield adjustments for slope and erosion for each crop in the A_1 and A-B horizons. However, yield estimates obtained from the Illinois Farm Bureau-Farm Management records are used as the initial starting point because they tend to reflect the present conditions more accurately.[10] These estimates, along with the annual yield reduction factors for each horizon and the number of years necessary to go from the A_1 to the A-B horizon, are summarized in Tables 2 through 5 according to the cultivation and slope categories set out in Table 1.

The expected yield of any crop may be predicted for any given year by using these tables. For example: What will the yield be 21 years from now for continuous corn? (See Table 2.) The initial yield is 67 bushels per acre. The slope adjustment factor reduces the initial yield 2.7 bushels. Furthermore, the expected yield will be reduced 0.47 bushels annually for 20 years — the time it takes to remove the remaining 3 inches of the A_1 horizon. Upon entering the A-B horizon, annual yield reductions will be .50 bushels and will remain at this level in the A-B horizon. Therefore, the expected yield of corn 21 years hence is:

Initial yield		67.0 bu.
Less slope factor.....	2.7	
Less erosion factor (A_1) (20 × .47).....	9.4	
Less erosion factor (A-B) (1 × .50).....	.5	
Total deductions		12.6
Expected yield		54.4 bu.

This analysis does not include the effects of soil deposited in lower areas. In some instances this may require cleaning of ditches, waterways, and terrace channels. It might also increase yields on the lower areas in some situations.

Calculation of Accumulated Net Returns

Information pertaining to prices and production costs was obtained from data published by the University of Illinois and the Illinois Crop Reporting Service.[11] Prices used were: corn, $1.00 per bushel; soybeans, $2.25 per bushel; oats, $0.62 per bushel; and hay, $19.25 per ton.

The expected yields are multiplied by the product prices to obtain total revenue per acre for each year. Direct costs and fertilizer costs, based upon the amount of nutrients removed by the crops, are deducted to obtain net revenue. With this assumption about fertilizer, the total returns will decrease annually due to the yield reductions from soil erosion.

Table 6 summarizes the net return estimates of eight rotations for the first year along with annual net return reduc-

[10] F. J. Reiss, Economics for Agriculture. TA-13, Dept. Agr. Econ. Univ. of Ill. 1962.

G. A. Peterson and E. R. Swanson, Highest Return Farming Systems for Tama and Muscatine Soils. Ill. Agr. Exp. Sta. Bul. 602. pp. 6-7. 1956.

[11] R. A. Hinton, Farm Management Manual. AE-3792, Dept. Agr. Econ. Univ. of Ill. pp. 3-4. 1962.

Ill. Agr. Stat. Annual Summary. Ill. Crop Rptg. Serv. Bul. 63-1. p. 68. 1963. *Ibid.* Bul. 62-2. p. 87. 1962.

Table 2. — Initial Yield Estimates of Crops and Annual Yield Reduction Factors for A_1 and A-B Horizons, by Rotation, Swygert, Up-and-Down Cultivation, 4% Slope

	Rotation[a]							
	1	2	3	4	5	6	7	8
Years[b]	20	33	28	33	52	73	156	88
Corn	*bu.*	*bu.*	*bu.*	*bu.*	*bu.*	*bu.*	*bu.*	*bu.*
Initial yield	67	71	71	72	75	77	80	79
Slope adjustment	2.73	2.73	2.73	2.73	2.73	2.73	2.73	2.73
Erosion factor (A_1)	.47	.30	.34	.30	.19	.13	.06	.11
Erosion factor (A-B)	.50	.32	.37	.32	.20	.14	.07	.12
Soybeans								
Initial yield	...	...	29	29	29	....	....	....
Slope adjustment	...	...	1.07	1.07	1.07	....	....	....
Erosion factor (A_1)	...	...	.13	.12	.07	....	....	....
Erosion factor (A-B)	...	...	.14	.12	.08	....	....	....
Oats								
Initial yield	...	39	39	39	39	42	44	42
Slope adjustment	...	1.98	1.98	1.98	1.98	1.98	1.98	1.98
Erosion factor (A_1)	...	.22	.25	.22	.14	.10	.05	.08
Erosion factor (A-B)	...	.23	.27	.23	.14	.10	.05	.09
Meadow	*ton*	*ton*	*ton*	*ton*	*ton*	*ton*	*ton*	*ton*
Initial yield	...	...	...	...	2.9	2.9	2.9	3.3
Slope adjustment	...	...	...	...	.136	.136	.136	.136
Erosion factor (A_1)	...	...	...	...	.009	.007	.003	.006
Erosion factor (A-B)	...	...	...	...	.010	.007	.003	.006

[a] 1 — Continuous corn; 2 — C-C-O(cl); 3 — C-C-SB-O(cl); 4 — C-SB-O(cl); 5 — C-C-SB-O-M; 6 — C-C-O-M; 7 — C-O-M; 8 — C-C-O-M-M.
[b] Number of years necessary to remove the remaining 3 inches of A_1 horizon.

Table 3. — Initial Yield Estimates of Crops and Annual Yield Reduction Factors for A_1 and A-B Horizons, by Rotation, Swygert, Up-and-Down Cultivation, 6% Slope

	Rotation[a]							
	1	2	3	4	5	6	7	8
Years[b]	13	21	18	21	28	41	72	47
Corn	*bu.*	*bu.*	*bu.*	*bu.*	*bu.*	*bu.*	*bu.*	*bu.*
Initial yield	67	71	71	72	75	77	80	79
Slope adjustment	4.49	4.49	4.49	4.49	4.49	4.49	4.49	4.49
Erosion factor (A_1)	.74	.46	.53	.46	.24	.24	.14	.21
Erosion factor (A-B)	.79	.49	.57	.49	.37	.26	.14	.22
Soybeans								
Initial yield	...	...	29	29	29	....	....	....
Slope adjustment	...	...	1.76	1.76	1.76	....	....	....
Erosion factor (A_1)	...	...	.21	.18	.13	....	....	....
Erosion factor (A-B)	...	...	.22	.19	.14	....	....	....
Oats								
Initial yield	...	39	39	39	39	42	44	42
Slope adjustment	...	3.26	3.26	3.26	3.26	3.26	3.26	3.26
Erosion factor (A_1)	...	.34	.39	.34	.25	.17	.10	.15
Erosion factor (A-B)	...	.36	.41	.36	.27	.19	.11	.16
Meadow	*ton*	*ton*	*ton*	*ton*	*ton*	*ton*	*ton*	*ton*
Initial yield	...	...	...	...	2.9	2.9	2.9	3.3
Slope adjustment	...	...	...	...	.225	.225	.225	.225
Erosion factor (A_1)	...	...	...	...	.017	.012	.007	.010
Erosion factor (A-B)	...	...	...	...	.018	.013	.007	.011

[a] 1 — Continuous corn; 2 — C-C-O(cl); 3 — C-C-SB-O(cl); 4 — C-SB-O(cl); 5 — C-C-SB-O-M; 6 — C-C-O-M; 7 — C-O-M; 8 — C-C-O-M-M.
[b] Number of years necessary to remove the remaining 3 inches of A_1 horizon.

Table 4. — Initial Yield Estimates of Crops and Annual Yield Reduction Factors for A_1 and A-B Horizons, by Rotation, Swygert, Contouring, 4% Slope

	Rotation[a]							
	1	2	3	4	5	6	7	8
Years[b]	41	66	57	66	105	150	301	177
Corn	*bu.*	*bu.*	*bu.*	*bu.*	*bu.*	*bu.*	*bu.*	*bu.*
Initial yield	67	71	71	72	75	77	80	79
Slope adjustment	2.73	2.73	2.73	2.73	2.73	2.73	2.73	2.73
Erosion factor (A_1)	.24	.15	.17	.15	.09	.07	.03	.06
Erosion factor (A-B)	.25	.16	.18	.16	.10	.07	.03	.06
Soybeans								
Initial yield	...	...	29	29	29	....	....	....
Slope adjustment	...	...	1.07	1.07	1.07	....	....	....
Erosion factor (A_1)	...	...	.07	.06	.04	....	....	....
Erosion factor (A-B)	...	...	.07	.06	.04	....	....	....
Oats								
Initial yield	...	39	39	39	39	42	44	42
Slope adjustment	...	1.98	1.98	1.98	1.98	1.98	1.98	1.98
Erosion factor (A_1)	...	.11	.12	.11	.07	.05	.02	.04
Erosion factor (A-B)	...	.11	.13	.1149	.07	.05	.03	.04
Meadow	*ton*	*ton*	*ton*	*ton*	*ton*	*ton*	*ton*	*ton*
Initial yield	...	...	...	...	2.9	2.9	2.9	3.3
Slope adjustment	...	...	...	...	.136	.136	.136	.136
Erosion factor (A_1)	...	...	...	...	.005	.003	.002	.003
Erosion factor (A-B)	...	...	...	...	.005	.004	.002	.003

[a] 1 — Continuous corn; 2 — C-C-O(cl); 3 — C-C-SB-O(cl); 4 — C-SB-O(cl); 5 — C-C-SB-O-M; 6 — C-C-O-M; 7 — C-O-M; 8 — C-C-O-M-M.
[b] Number of years necessary to remove the remaining 3 inches of A_1 horizon.

Table 5. — Initial Yield Estimates of Crops and Annual Yield Reduction Factors for A_1 and A-B Horizons, by Rotation, Swygert, Contouring, 6% Slope

	Rotation[a]							
	1	2	3	4	5	6	7	8
Years[b]	26	42	37	42	57	81	144	95
Corn	*bu.*	*bu.*	*bu.*	*bu.*	*bu.*	*bu.*	*bu.*	*bu.*
Initial yield	67	71	71	72	75	77	80	79
Slope adjustment	4.49	4.49	4.49	4.49	4.49	4.49	4.49	4.49
Erosion factor (A_1)	.37	.23	.27	.23	.17	.12	.07	.10
Erosion factor (A-B)	.39	.25	.28	.25	.18	.13	.07	.11
Soybeans								
Initial yield	...	...	29	29	29	....	....	....
Slope adjustment	...	...	1.76	1.76	1.76	....	....	....
Erosion factor (A_1)	...	...	.10	.09	.07	....	....	....
Erosion factor (A-B)	...	...	.11	.10	.07	....	....	....
Oats								
Initial yield	...	39	39	39	39	42	44	42
Slope adjustment	...	3.26	3.26	3.26	3.26	3.26	3.26	3.26
Erosion factor (A_1)	...	.17	.19	.17	.12	.09	.05	.08
Erosion factor (A-B)	...	.18	.20	.18	.13	.09	.05	.08
Meadow	*ton*	*ton*	*ton*	*ton*	*ton*	*ton*	*ton*	*ton*
Initial yield	...	...	...	...	2.9	2.9	2.9	3.3
Slope adjustment	...	...	...	...	.225	.225	.225	.225
Erosion factor (A_1)	...	...	...	...	.009	.006	.003	.005
Erosion factor (A-B)	...	...	...	...	.009	.006	.004	.006

[a] 1 — Continuous corn; 2 — C-C-O(cl); 3 — C-C-SB-O(cl); 4 — C-SB-O(cl); 5 — C-C-SB-O-M; 6 — C-C-O-M; 7 — C-O-M; 8 — C-C-O-M-M.
[b] Number of years necessary to remove the remaining 3 inches of A_1 horizon.

Table 6. — Estimates of Net Returns per Rotation Acre for the First Year of the Planning Horizon and Annual Net Return Reduction Factors for the A_1 and A-B Horizons, by Rotation, Slope, and Method of Cultivation

Rotation	Up-and-down cultivation		Contouring	
	4% slope	6% slope	4% slope	6% slope
Continuous corn				
Net returns	$24.57	$19.45	$24.76	$19.76
Annual reduction				
A_1 horizon	.40	.63	.20	.31
A-B horizon	.42	.66	.21	.33
C-C-O(cl)				
Net returns	$18.72	$15.55	$18.82	$15.72
Annual reduction				
A_1 horizon	.20	.32	.10	.15
A-B horizon	.22	.34	.11	.18
C-C-SB-O(cl)				
Net returns	$22.18	$17.27	$22.32	$17.47
Annual reduction				
A_1 horizon	.25	.39	.12	.19
A-B horizon	.26	.40	.13	.20
C-SB-O(cl)				
Net returns	$20.30	$14.86	$20.65	$15.01
Annual reduction				
A_1 horizon	.19	.32	.10	.16
A-B horizon	.22	.34	.11	.17
C-C-SB-O-M				
Net returns	$20.88	$15.66	$20.96	$15.80
Annual reduction				
A_1 horizon	.15	.26	.08	.13
A-B horizon	.16	.27	.08	.14
C-C-O-M				
Net returns	$19.16	$15.24	$19.22	$15.34
Annual reduction				
A_1 horizon	.09	.18	.05	.08
A-B horizon	.11	.19	.06	.09
C-O-M				
Net returns	$15.46	$11.35	$15.49	$11.37
Annual reduction				
A_1 reduction	.04	.09	.02	.04
A-B horizon	.04	.10	.03	.04
C-C-O-M-M				
Net returns	$20.28	$16.13	$20.32	$16.20
Annual reduction				
A_1 horizon	.07	.15	.03	.07
A-B horizon	.08	.16	.04	.07

tion factors for both horizons. The differences between the two horizons for a given rotation are, for the most part, negligible. The largest difference is 3 cents.

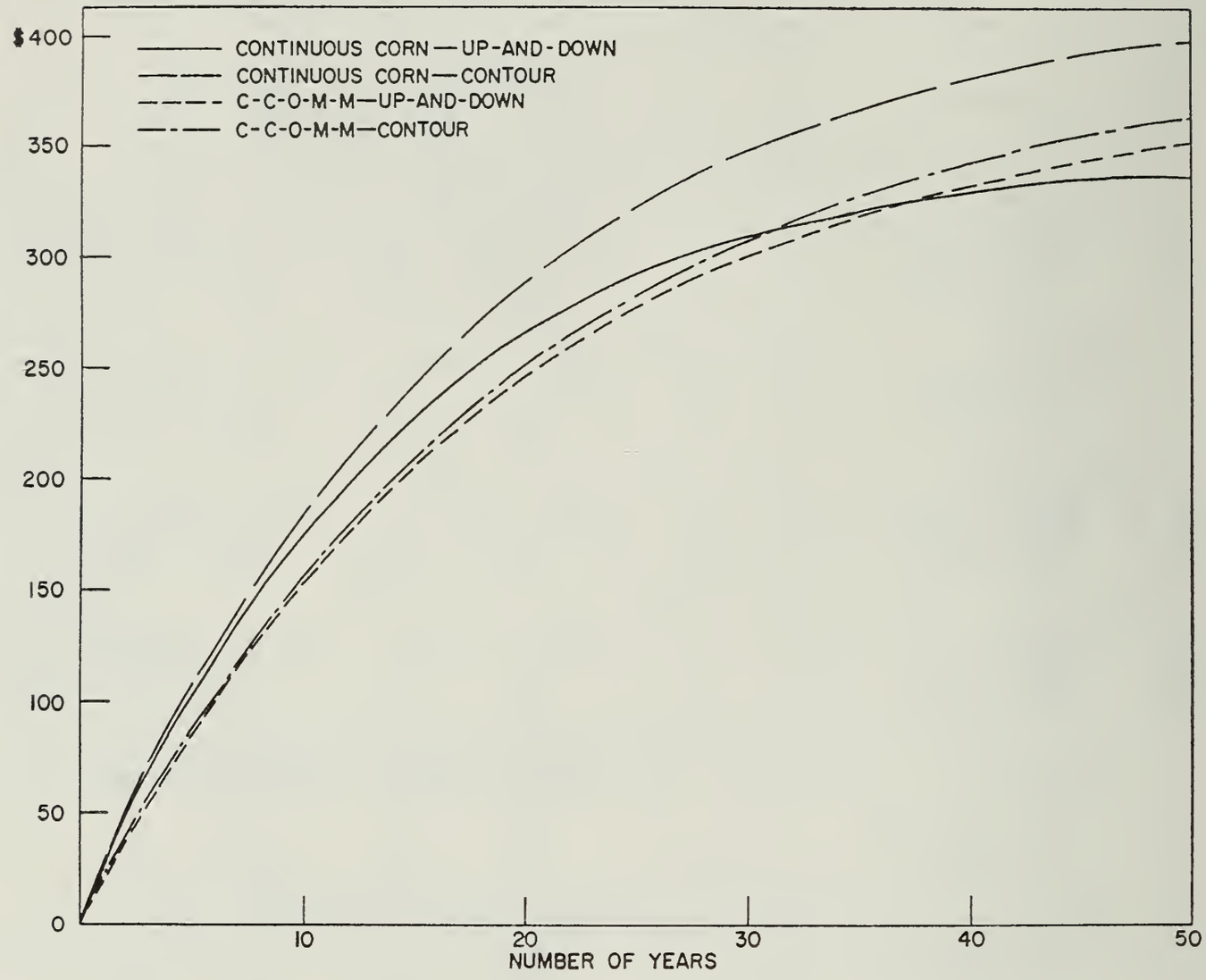
Comparison of Cropping Systems

The present values of accumulated future returns from two selected rotations for planning horizons up to 50 years are presented in Figures 3 and 4. The role of the length of the planning horizon and the size of the discount rate can be seen by a study of these figures.

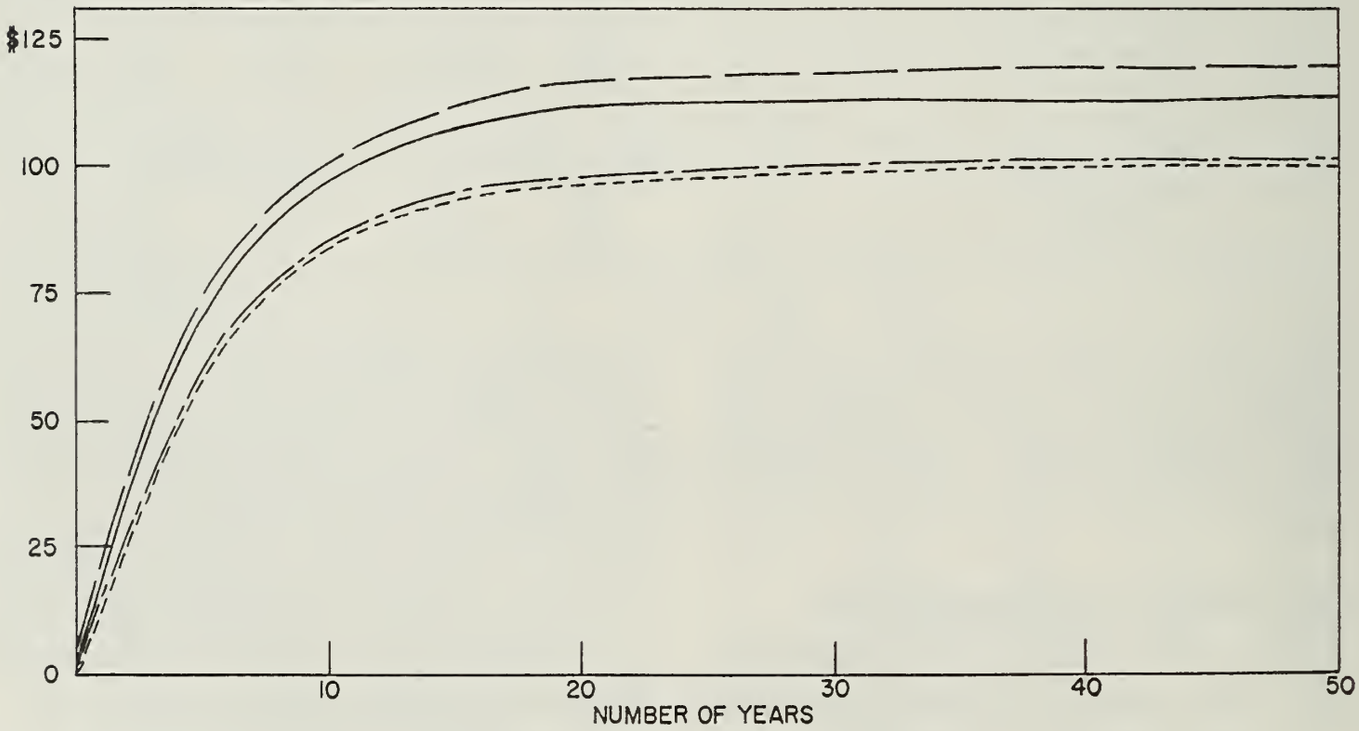
With *up-and-down cultivation,* on the 4-percent slope group, continuous corn is a more profitable cropping system with a 5-percent discount rate for all planning horizons up to about 37 years (Fig. 3A), after which the C-C-O-M-M rotation be-

Fig. 3. — Present value of accumulated net income, Swygert soils, 4% slope.

A — 5% Discount



B — 20% Discount (key to graph lines same as above)

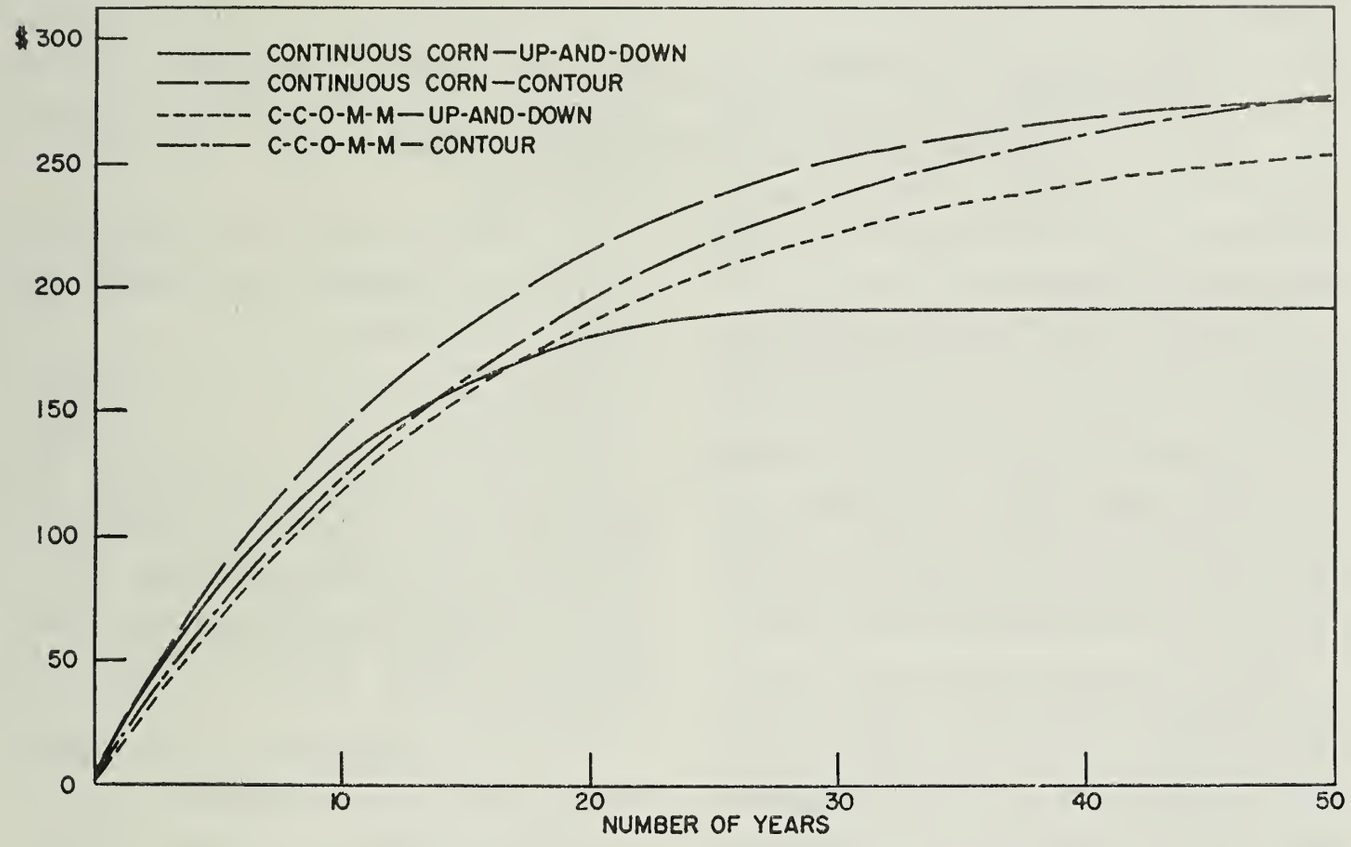


comes more profitable. When a low interest rate is used for discounting, plans giving higher returns in the latter years of the planning horizon will be favored. Normally, a less intensive rotation will be selected by using this criterion.

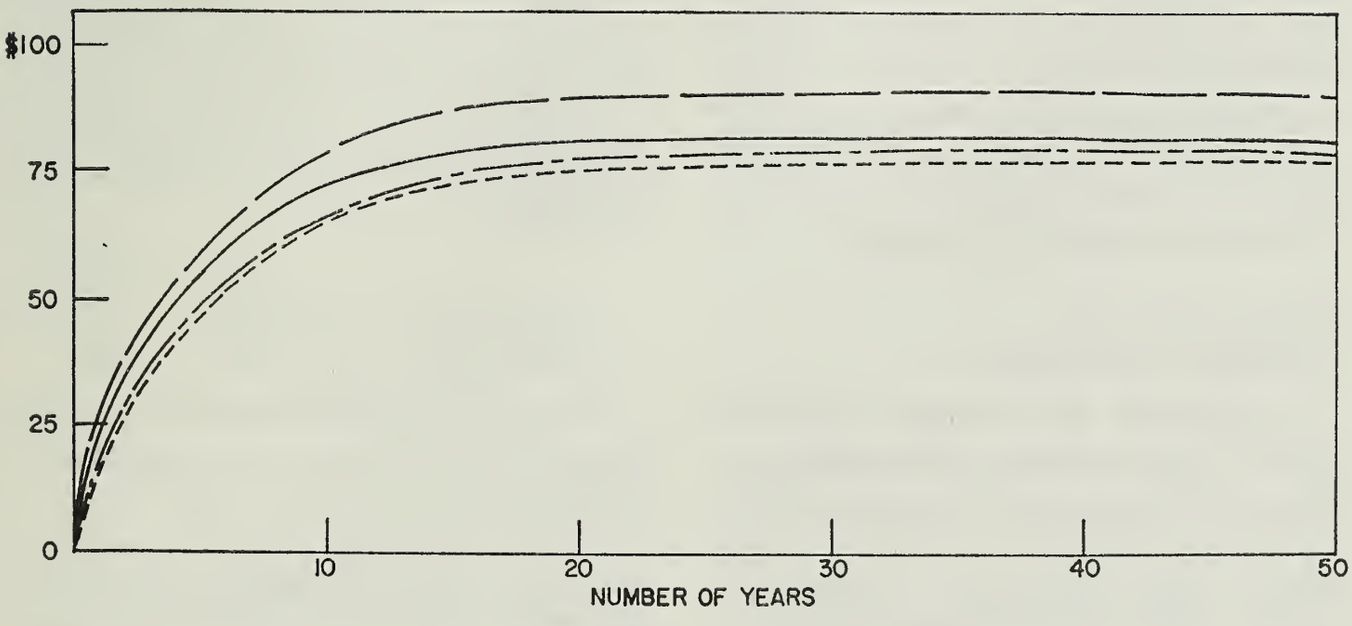
A higher discount rate extends the period over which the more intensive rotation remains optimal. For a 20-percent discount rate on the 4-percent slope with up-and-down cultivation, continuous corn has the highest present value at the end

Fig. 4. — Present value of accumulated net income, Swygert soils, 6% slope.

A — 5% Discount



B — 20% Discount (key to graph lines same as above)



of the 50-year period (Fig. 3B). At this discount rate, incomes beyond about 25 years have very small present values.

Steeper slopes tend to shorten the period over which an intensive rotation remains optimal, because the soil losses are relatively greater. On the 6-percent slopes with up-and-down cultivation, continuous corn is optimal for all planning horizons under 17 years when a 5-percent discount rate is used (Fig. 4A). At about 17 years, the C-C-O-M-M rotation becomes more profitable than continuous corn. Not shown in the figure is the C-C-SB-O-M rotation, which surpasses continuous corn in accumulated returns after about 27 years.

As on the 4-percent slope, using a discount rate of 20 percent extends the period over which continuous corn remains optimal (Fig. 4B). Continuous corn with up-and-down cultivation remains optimal for all planning horizons under 50 years as opposed to 17 years when a 5 percent interest rate is used.

With *contouring,* continuous corn remains optimal on 4-percent slopes for the entire 50-year period at both discount rates. (See Figs. 3 and 4.) On 6-percent slopes, C-C-O-M-M has the greater accumulated returns after 46 years with a 5-percent discount rate. At a 20-percent rate, continuous corn still has the higher accumulated returns at 50 years. Since contouring generally reduces soil losses by one-half, the period over which more intensive rotations remain optimal is extended by adopting this practice.

Soil Loss Tolerance vs. Profit Maximization

To illustrate how income is sacrificed by adopting a rotation that satisfies the soil loss tolerance, the following rotations on 4-percent slopes are taken as an example: continuous corn, C-C-SB-O-M, and C-C-O-M-M. Of these, only C-C-O-M-M meets the soil loss tolerance of 3 tons per acre (Table 1). With a 25-year planning period and with contouring, the plow layers in all soils would still be in their A_1 horizons. With contouring, the A-B horizon (mixture of lower A and upper B horizons) is entered after 41 years with continuous corn, after 105 years with C-C-SB-O-M, and after 177 years with C-C-O-M-M. At the end of this 25-year period, it is not likely that the land market would be sensitive enough to pick up differences in the depth of the A_1 horizon and reflect them in land values.

The present value of the net returns at 5-percent discount over the 25-year period is as follows:

Continuous corn	$322
C-C-SB-O-M	285
C-C-O-M-M	282

According to these calculations, the present value of income sacrificed by meeting soil loss tolerance with C-C-O-M-M instead of using continuous corn is $322 minus $282, or $40 per acre for the 25 years.

A similar calculation for 50 years shows less relative difference:

Continuous corn	$397
C-C-SB-O-M	361
C-C-O-M-M	363

Under conditions of considerable uncertainty about the future, or with capital limitations, a higher discount rate may be appropriate. With a 20-percent discount rate, the 25- and 50-year comparisons are as follows:

	25 years	*50 years*
Continuous corn	$118	$119
C-C-SB-O-M	102	103
C-C-O-M-M	100	101

With such a high discount rate, what happens after 25 years is of virtually no consequence.

No attempt is made here to assess the importance, as an obstacle to adoption of soil conservation plans, of the calculated

income losses that would be incurred by adopting a plan that is within the acceptable soil loss. It could be argued that they are quite small when looked at on an annual basis. These results do, however, differ from the prevailing belief that "soil conservation pays" for the individual farmer. This, of course, does not mean that it is not in the best interests of society to keep annual soil losses on Swygert soils at 3 tons or less per acre. The analysis only suggests that if the relationship between soil loss and yield is studied in isolation from changes in technique of production, a farmer on Swygert soils would sacrifice income by keeping soil losses at or below the acceptable level.

Methods of Agricultural Price Support and Stabilization in Australia[1]

JACK N. LEWIS

FAVORED METHODS of price support give a country's agricultural policy much of its distinctive character. The role of variable import levies as the basic instrument of EEC's common agricultural policy is one of its outstanding specific characteristics. Similarly the general use of deficiency payments has characterized the United Kingdom's postwar agricultural price policy, although recently a tendency to depart from this pattern has become apparent.

This article examines the various price support methods used in Australia and seeks to identify their characteristic behavioral patterns. Its primary purpose is to present a classification of currently operating price programs for agriculture. Description is, however, rounded out by a brief review of the formative influences shaping the development of Australian price policy.

Basis of Classification

Classification is sometimes said to be, of itself, barren. However, an analytically oriented classification greatly assists our understanding of agricultural programs. Too often classifications of price support measures are based on the objectives or incidental consequences of the program rather than on the essentials of method. Thus the Haberler Committee Report[2] classified methods into three categories — those which directly discourage imports, those which directly encourage exports, and those which directly encourage home production. This classification is inoperable and incomplete. It is hard to find a niche in it for all those forms of price discrimination other than export dumping, and clearly the categories are not mutually exclusive.

At other times classifications bring to the forefront the specific institutional arrangements employed to implement a program, while failing to bring out the essential operative mechanism (for example, price discrimination between end uses of product is included but is listed variously as denaturing of foodstuffs, marketing orders, etc.). This practice can conceal the limited number of real alternatives open in price policy. Old friends are frequently encountered in the

[1] The detailed framework used in this article to classify price support measures was developed in association with D. A. Muir, University of Illinois, Department of Agricultural Economics, whose assistance the author gratefully acknowledges.

[2] Trends in International Trade. GATT, Geneva. pp. 81-82. Oct., 1958.

guise of powerful newcomers to the society of price support methods.

Adoption of a classification matrix, an aid to clear thinking on agricultural programs, may have important implications for the success of comparative studies of agricultural policy and of international efforts to draw up a code of behavior or set of guiding principles for price support and stabilization measures.

The framework adopted here employs a tripartite division into measures to control or influence supply, measures to influence demand, and measures to directly augment prices. This is the usual grouping found in American works on agricultural policy. Within these three categories, however, there has been one major departure from usual practice. Multiple-price programs have been included in the supply management category and not under the heading of measures influencing demand. In consequence a much larger than usual proportion of price support programs are classed under supply management. D. Gale Johnson, Rainer Schickele and Dale Hathaway, for example, all choose to regard various forms of price discrimination as essentially demand shifters. The apparent rationale for this view is that, for a given quantity, price realizations are in such cases increased by separating and discriminating between markets. The aggregate demand schedule, it can therefore be contended, has moved upward and to the right.

It seems more consistent with normal usage of the conceptual apparatus of supply and demand, however, to consider such multiple-price schemes as a form of supply control. Their essential function is, by discriminatory pricing, to appropriate for agricultural producers some of the consumer surplus formerly existing in the now higher-priced market. The underlying demand relationships in the two or more markets are not necessarily changed. Moreover, the implementation task is one of controlling the flow of supply to separate markets and of preventing intermarket substitution.

A Classification of Australia's Programs

Table 1 shows, for each of a number of agricultural commodities in Australia, the combination of measures making up the present price support or stabilization program.

Some measures not employed in agricultural pricing in Australia, such as buffer stocks and price discrimination by income group (food stamp plan) are included in the table. The table is not intended, however, to give an exhaustive enumeration of possible methods. Moreover, product promotion programs, financed through levies on growers, are not tabulated as price support measures. The wool industry's promotion campaign is the most ambitious of these, and this year wool-grower contributions are for the first time being supplemented by a matching grant from the Commonwealth Government. Despite the Wool Board's representation of its promotion and advertising program as a method of achieving reasonable prices to producers, it is very doubtful whether such self-imposed reductions in producer prices will achieve this objective. The wool industry's success in obtaining the government's financial assistance may be an important gain for the advertising industry, since strong pressures for similiar treatment can now be expected from other primary products.

It will be observed from the table that, like the United States, Australia has made use of most of the cards in the agricultural price policy deck and some are particularly well thumbed. The discernible main patterns and noteworthy tendencies are:

(a) No price supports as such operate

Table 1. — A Classification of Agricultural Price Programs in Australia[a]

	Wheat	Whole milk	Butter, cheese, and processed milk	Beef	Sugar	Cotton	Tobacco	Rice	Raisins and currants	Eggs	Peanuts	Linseed[b]	Canned fruits	Barley[c]
Supply Control														
Supply level														
Restriction of inputs (W = water, L = land)	...	...	...	...	L	...	...	W	W	...	...	...	...	...
Import restrictions (Q = quantitative, T = tariff)	T	...	T	...	Q	T	T	T	T	T	T	Q	T	...
Marketing quotas	...	X	...	...	X	...	...	...	...	...	...	...	...	...
Product destruction	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Supply diversion														
Time (Buffer stock)	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Place (Home consumption price)	X	...	X	...	X	...	...	X	X	X	...	...	...	X
Purpose (Price discrimination by end use)	...	X	...	...	X	...	...	...	...	X	X	...	...	...
Income group (Food stamp plan, etc.)	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Demand Influences														
Mixing regulations (Or induced purchase by tariff arrangements, etc.)	...	...	...	...	...	X	([d])	...	...	...	X	X	([e])	...
Restriction of substitutes	...	X	X	...	X	...	...	...	...	...	...	...	...	...
Public consumption (School milk programs, etc.)	...	X	...	...	...	...	...	...	...	...	...	...	...	...
Export contracts (B.P.T. = British preferential tariff)	X	...	...	([f])	X B.P.T.	...	...	...	B.P.T.	...	...	...	B.P.T.	...
Direct Price Augmentation														
Buffer fund	X	...	...	...	...	...	...	...	X	...	...	...	...	...
Subsidy														
Deficiency payment	X	...	...	...	...	X	...	...	...	...	...	...	...	...
Flat rate or fixed amount	...	...	X	...	...	...	...	...	...	...	...	...	...	...

[a] Wool, mutton, and lamb have no support programs, other than industry-financed promotion schemes. Reserve price or buffer stock programs have been used for wool while stocks were being cleared after each world war.
[b] Importer monopoly subject to contracting for Australian crop.
[c] Program for the two main producing states, Victoria and South Australia.
[d] Lower import duty for firms using prescribed percentages of Australian leaf.
[e] Canners can buy sugar more cheaply if they pay prescribed minimum prices for fruit.
[f] Fifteen-year meat agreement with United Kingdom.

for products of the pastoral industry (wool, beef, mutton and lamb).

(b) There is a strong predisposition to the use of supply diversion programs. The home consumption price scheme, involving price discrimination between domestic and export markets, is the most preferred instrument of price support, being employed for wheat, dairy products, dried vine fruits, sugar, rice, eggs, barley, and canned fruits. Multiple-price schemes, involving discrimination between end uses of the products, are also common. They are currently being used for milk, sugar, eggs, and peanuts and were once applied also to wheat for human consumption and livestock feed.

(c) Import duties and, in a few instances, quantitative restrictions (for example, an embargo on sugar imports) are used in conjunction with home consumption price programs. These are a necessary adjunct serving to keep domestic and export markets separate, to prevent reimports and to discourage imports which might otherwise be attracted by higher price levels on the domestic market. Some tariffs are vestigial. The import duty of 3d. per bushel on wheat, for example, is certainly not currently needed to protect the Australian industry's home consumption price.

(d) The buffer-fund or stabilization-fund device, by which intertemporal transfers of export receipts are effected, is employed in the wheat and dried vine fruits industry stabilization programs. It was also a feature of the first 5-year dairy industry stabilization plan adopted in 1947.

(e) In the case of commodities for which production is less than domestic consumption, there is some partiality toward measures to induce full purchase of the domestic crop without increasing landed prices of imports. A good example is the use of concessional import duty rates to tobacco and cigarette manufacturers who utilize prescribed minimum percentages of Australian leaf. Somewhat similar devices are used to support the prices of linseed and peanuts.

Historical and Institutional Background

The most favored method of price support — the home consumption price scheme — was applied widely during the thirties. The case made for this form of support for agriculture was reminiscent of the campaign to "make the tariff effective for agriculture" associated with the McNary-Haugen Plan in the U.S.A. It was claimed that home consumption price programs would compensate primary industries for the increases in their costs resulting from tariff protection of secondary industries.

There had been a two-price program for sugar since World War I when Australia's sugar output first exceeded domestic consumption. Moreover, an ingenious scheme known as the Paterson Plan, introduced in 1926, gave the dairy industry, in effect, a two-price program. Under the Paterson Plan a levy of a penny per pound was imposed on all factory butter produced, and the proceeds were used to pay a subsidy of threepence per pound on butter exports. (Exports amounted to approximately one-third of production at the commencement of the program.) The result was that the domestic price, which had previously been at export parity, rose to equal the export price plus bounty. By taxing itself a penny a pound the Australian dairy industry could thus achieve a net increase of twopence per pound in average returns.

The benefits of this program were rapidly eroded by increased butter production and lower per capita consumption, which together resulted in a rising proportion of exports to total production.

There was also some rise in the production of farm butter, which was exempt from the levy. By 1934 the plan had outlived its usefulness. However, its initial magic had a powerful appeal among Australian primary producers and it undoubtedly helped to create the subsequent predilection for price discrimination.

Another transpacific influence upon Australian agricultural policy during the interwar period may be observed in the development of cooperative marketing. Some Australian rural industries adopted the slogans and some of the philosophy of the Sapiro movement during the 1920's. When cooperatives proved to have fatal flaws as instruments of supply control, efforts to patch up these weaknesses led to the development in Queensland of statutory marketing boards. Other states followed this example and passed legislation providing for the introduction of compulsory marketing through a board. The proposals were subject to a referendum and majority approval of producers in each industry concerned. The powers of government were thus to be lent to agricultural industries to assist them in implementing "orderly marketing" programs. The marketing board has become one of the most characteristic institutions of agricultural marketing in Australia, typically diverting supply to lower-order uses or to export in order to increase producer returns.

In some other respects, however, Australian institutions are distinctly unfavorable to the use of this particular method of price support. The division of powers in the federal constitution has occasioned serious difficulties. Indeed much of the history of agricultural policy in Australia would be concerned with the frustrations encountered by, and the expedients resorted to by, primary producers in their efforts to circumvent checks imposed by the constitution and to organize for themselves a position of monopoly power. The prolonged litigation and shifting interpretation of key sections of the constitution by the courts, the frequent invalidation of programs, and the resulting uncertainty as to what is practicable have had a major influence upon the evolution of agricultural price policy.

Section 92 of the constitution requires that interstate trade shall be "absolutely free." It is problematical whether, in making this provision, the drafters of the constitution had in mind anything beyond the dismantling of state tariffs upon federation. The provision has, however, been interpreted by the courts in a way which has hampered government and producer efforts to achieve the conditions necessary for successful supply diversion. A producer can usually escape diversion of his share of the crop to lower-priced outlets by shipping his produce across a state border (although in a recent case the judgment disallowed the practice of sending Queensland eggs on short joy-rides across the New South Wales border on their way to market, in order to avoid control by the marketing board). A number of marketing programs have collapsed after being undermined by evasions of this kind. Others have been found to be in violation of Section 92.

Some programs, notably for dairy products and dried vine fruits, have continued on a voluntary basis, reinforced in the case of the vine fruits by a system of licensing packers through state boards. There is at least an implied threat that noncooperators may be delicensed for unsanitary premises or similar offenses.

This shaky legal basis of home consumption price schemes in Australia has made it easier to establish such programs for commodities which are bottlenecked through a processing point at some early

point in the marketing chain. Voluntary schemes are much more viable when there are limited numbers of processing points, such as dairy factories, sugar mills, or dried fruit packing houses.

There are, of course, different methods available for equitably sharing the benefits of a two-price plan among producers. In Australia the favored method has been to pay producers an equalized price (average net realization from all markets and end uses). Quotas giving each producer an entitlement to sell a certain quantity to the higher-priced outlet have been used only in milk marketing within the whole milk zones.

A number of agricultural economists have advocated the abandonment of price equalization during the last five years and have suggested individual quotas or home-market participation rights. This plan will be recognized by Americans as one put forward in rudimentary form by W. J. Spillman in 1927 and independently advanced by Beardsly Ruml. It was subsequently developed and advocated by John D. Black and M. L. Wilson in the late twenties and early thirties under the name of "domestic allotments," a name which was later applied to a very different measure. A good discussion of its advantages over price equalization is contained in an article by Brinegar and Johnson[3] who also extend the principle to other instruments of price support as well as two-price schemes.

The essential difficulty with price equalization along the Australian pattern is that it creates divergence between private and social marginal returns. Individual farm operators receive and plan on the basis of receiving the equalized price for additional output, whereas only the export price or the return from a lower-order use accrues to the industry as a whole. Erosion of benefits by increasing output often ensues. Moreover, the difference between the equalized price and the industry's marginal return is capitalized into land and livestock values. As a result alternative enterprises, such as forestry or beef production in dairying areas, often face inflated factor prices which impede land use adjustments and arbitrarily affect interregional competition.

This problem confronts all rural industries employing multiple-price programs in Australia except, to some extent, sugar, rice, and dried vine fruits where some measure of production control is feasible. For some of these commodities, restrictions on land or water inputs have been facilitated until now by the location of production primarily within one state (as for sugar and rice). This control may be more difficult to achieve when production of rice and sugarcane is developed in Western Australia.

Formulation and implementation of production control programs for Australian agriculture is somewhat complicated by the constitutional division of powers and by the repeated failure of efforts towards constitutional amendment. Powers over production are among the residual powers assigned to state governments. In order to introduce production controls, either in the form of marketing quotas or of restrictions on inputs, it would be necessary first to secure agreement at the Australian Agricultural Council and then secure authority in each state concerned by means of complementary or enabling legislation.

As a result production controls have been little used in Australia's agricultural price support programs. Indeed it is more than a contradiction to describe the market structure for a number of important Australian primary products as "atomistic monopoly." Government powers have

[3] G. K. Brinegar and Stewart Johnson, On Letting Go of the Bear's Tail. Jour. Farm Econ. 36(1):30-43. Feb., 1954.

been deployed to place producers in a position of monopoly power, but decisions on how much to produce remain in the hands of individual producers. Not only does the lack of production control leave the program open ended, but a misleading inducement to expand output is built into the producers' planning price by the price equalization arrangement.

The consequences have sometimes taken a long time to come to a head. They caught up with the dairy industry several years ago, but the federal government is persisting with the program virtually unchanged. The Australian wheat industry has so far escaped the ultimate consequences of its price stabilization program. Perhaps, however, only the fortuitous outlets found recently for large quantities of wheat in mainland China and the U.S.S.R. have deferred a reckoning and enabled a further 5-year extension of a program without production controls (and without even nullification of production inducements) to be undertaken in 1963.

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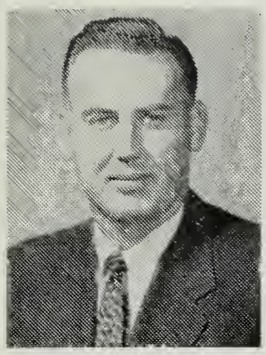

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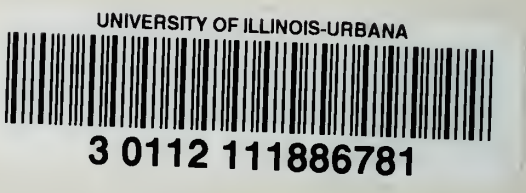

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